Northern California's Computer Magazine
Jan. 5, 1994 • #118

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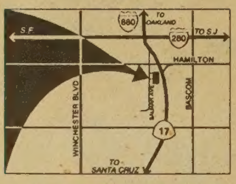

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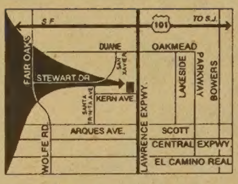

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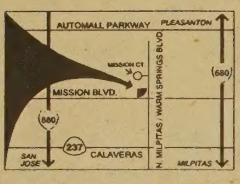

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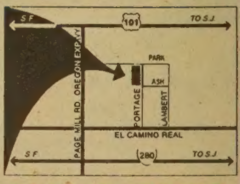

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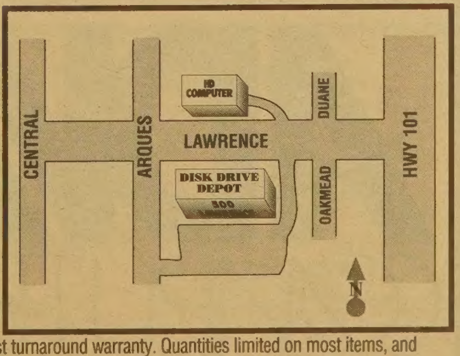

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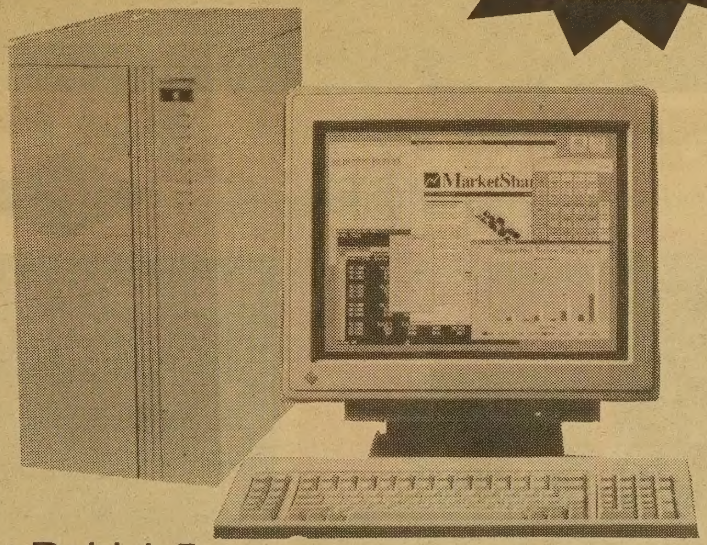

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A NOTE FROM THE EDITORS

As we enter the new year and look back on the old one, we're pleased to be able to bring you some perspectives from Alvin and Heidi Toffler, whose work over the last two decades has been a source of great insight as to where all this technology is taking us.

We're also pleased to bring you the perspective of our friend Rich Karlgaard, editor of *Forbes ASAP*, on a similar issue, and expect that it will provoke some interesting and perhaps heated response.

And of course, following in our time-honored tradition, we bring you this year's version of the *MicroTimes* 100 list, the denizens of which have, in one way or another, had a significant impact on the lives of all of us computer users during 1993.

Happy new year from all of us at *MicroTimes!*

—ME

Micro Marketplace
A Special Advertising Section For Southern California Computer Buyers Starts on Page 76

COVER STORY

Surfing The Third Wave

Alvin And Heidi Toffler On Life And Work In The Information Age

By Mary Eisenhart
Cover Photo: Michael Jay

From *Future Shock* in 1970 to their recent work *War and Anti-War,* the Tofflers have provided insightful perspectives on the social and cultural impacts of technology. We recently had the opportunity to visit with the Tofflers and discuss the profound changes wrought by digital technology on the way we live and work. 92

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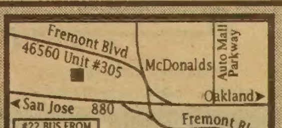

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Rich Karlgaard, whose essay on NAFTA, Moore's Law, and related matters begins on page 29, is no stranger to the fine art of goring sacred oxen, as much of his past work at *Upside* and current work at *Forbes ASAP* attests. We rather expect this piece to generate heated controversy and invite responses; we also think he raises important issues that merit discussion.

We invite your responses to this and our other articles at our various addresses:

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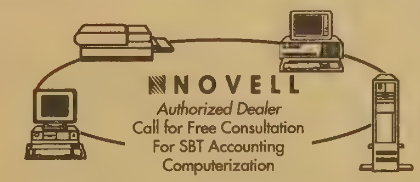

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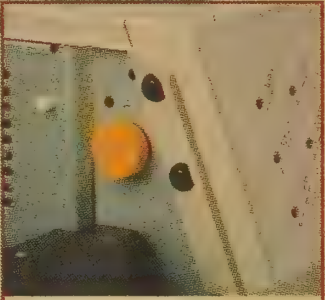

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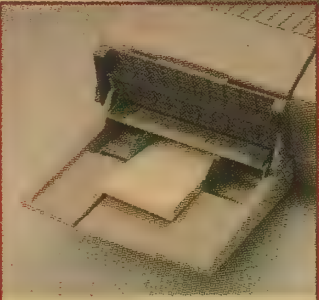

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Patents And PowerPC

Compton's Announces Patent on Almost All Multimedia—To Great Skepticism

BY PAUL HOFFMAN

The US patent system has been widely criticized for the way it deals with software, and a recent announcement by Compton's New Media that they have received a patent for essentially all hypertext multimedia will certainly increase that criticism.

Compton's claims that the patent, issued in August, gives them the right to force any company creating searchable multimedia to pay royalties to Compton's. The immediate response from most of Compton's competitors has cast both Compton's and the entire patent process in an incredibly negative light.

The patent, 5,241,671, says that Compton's invented the process by which a program can search for information that interrelates text and graphics. When the patent was seen by people who had been in the field for years before Compton's released its Multimedia Encyclopedia in 1989, it was roundly criticized.

Many of the company's competitors are considering challenging the patent by showing that the concepts covered in the patent were known and discussed before Compton's released its software, and that they are completely obvious. Some claim that the same set of features claimed by Compton's had been available in commercial products for many years before Compton's applied for the patent.

Although it costs a great deal of money to write up, submit, and defend a patent during the application process, it's not so expensive to challenge a patent. The challenger can simply request a reexamination of the patent, giving information that the challenger believes would make the patent invalid, such as publication of the ideas in the patent before it was applied for. All Compton's subsequent claims rest on the first, so anyone who can show that the parts of the first claim had been discussed or incorporated in other products could probably cause the entire patent to be revoked.

In fact, the main claim in the patent sounds suspiciously like many of the first HyperCard stacks that became available in 1987 and 1988. The claim, for "a computer search system for retrieving information" comprising ten parts, basically describes any one of a number of HyperCard stacks that let you retrieve pictures based on text descriptions and let you see the path of your search. In fact, all of the elements that the patent describes in the first claim were widely discussed in 1987 by journalists and Apple evangelists who were trying to explain what HyperCard was and why it was so exciting. The patent's other claims simply add bells and whistles to the first claim.

The uproar about the Compton's patent was immediate. Many companies, even those with good relations to Compton's, decried the chilling effect Compton's actions will have on the still-marginal multimedia market. Currently, millions of people have CD-ROM drives and multimedia-capable computers, but even the best CD-ROM titles are selling in thousands rather than hundreds of thousands. Compton's is demanding 1% of the standard list price of each title sold; that number will go up to 3% after June. Many companies object to the steep fees, which in some cases rival what outside authors get; they also object to having to report their sales to a direct, and clearly belligerent, competitor. Some competitors were particularly bothered that Compton's was so out of touch with the market that its press release could make statements like "our royalty structure and distribution options will benefit our licensees."

Compton's defends its actions by saying that it wants the industry to grow, but also wants the public to recognize its contribution to the field. Although the Compton's Multimedia Encyclopedia was one of the first general education titles available on CD-ROM, it was quickly seen to be insufficient for anything other than a demonstration of interesting capabilities. As such, it was soon overtaken by entertainment CD-ROMs.

Around the same time, an unrelated company announced another software patent that covers a different part of the CD-ROM market. TestDrive Corp. says that its patent gives it exclusive rights to "try before you buy" technology, which lets software marketers sell fully enabled software on CD-ROMs and allows the buyer to try the software a few times without purchasing it. TestDrive also said that its patent covers a wide range of other delivery technologies and that they were looking at competitors' products for violations.

The claims in the Compton's patent brings up an issue that has been simmering in software development circles for years: patents that should never have been issued due to prior use of the claimed features. The most common reason for patents to be overturned is a challenger showing that the patent is based on "prior art" that was known in the industry before the patent

Copyright © 1994 by Paul Hoffman. All rights reserved. Paul Hoffman is an industry analyst who has been covering microcomputer technology for ten years. He can be reached on Internet (phoffman @well) or CompuServe (71545,346). He also writes popular microcomputer books.

application. The situation is serious enough that many large companies have banded together to form the Software Patent Institute in Ann Arbor, Michigan, to help educate the US Patent Office about what prior art exists, to prevent the issuing of patents that are publicized but later overturned. The Compton's patent will certainly shine a brighter light on the whole issue of software patents and patent owners who threaten maturing markets with claims for royalties.

APPLE BANKING ON POWERPC SYSTEMS FOR 1994

You can tell when major Apple announcements are about three months away: the corporate leaks turn into gushes. In the case of its upcoming PowerPC-based systems, Apple is telegraphing its punches by taking out full-page ads in national magazines describing the wonders of systems that it has not yet announced. It is widely expected that Apple's first RISC-based systems will be shipped in March or April, with price tags comparable to its current line of computers.

The main reason that the PowerPC systems are so important is that many people expect the PowerPC processor to become one of the most popular CPUs in a very short amount of time. Backed by the two largest PC companies, IBM and Apple, the PowerPC chip could even take over the number one spot (currently held by the Sparc CPUs found in Sun computers) within a year or two. Early reports from software and hardware developers who have prototypes of Apple's upcoming systems say that they are already extremely reliable and run essentially all current Macintosh software quickly.

Apple's strategy for releasing its PowerPC computers may succeed where others have failed. Instead of replacing only its top-of-the-line Macintoshes with PowerPC systems, Apple is also replacing its mid-range systems as well. This is in distinct contrast to other companies' RISC strategies which have restricted RISC CPUs to running Windows NT as department-level servers, something that high-end 66 MHz 486 systems do just fine for half the cost. By bringing PowerPC into the mainstream (something that IBM may not even do for over a year), Apple is positioning itself as a technology leader with very fast systems.

The plan is likely to work for many reasons. The PC-compatible market is still basically a commodity market with little differentiation. Windows NT has made this worse by confusing people about whether they want to switch to a faster RISC processor that can only run one operating system. While Intel has competitors on its low- and mid-range CPUs, it is pretty much alone near the top of the speed range. Although many people thought that RISC chips could threaten these high-end processors, that will only happen when Windows NT takes off; now, there is little chance of that happening.

Even Microsoft admits that most people are waiting instead for the next release of Windows, due in mid-1994. Humorously, Windows NT will probably run on PowerPC-based systems at that time.

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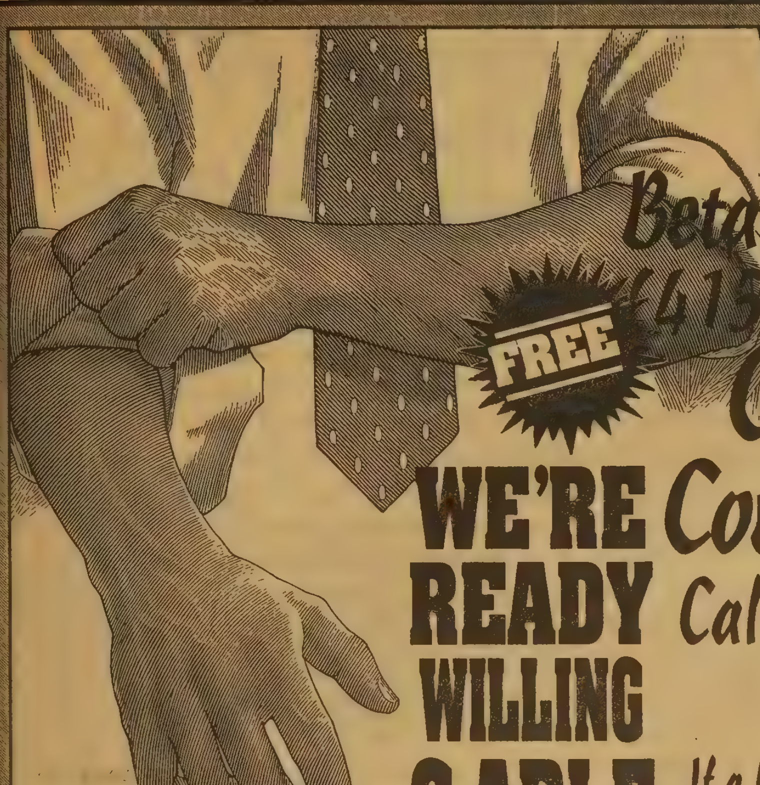

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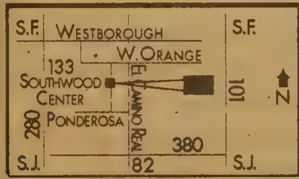

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another-Windows-NT system, Apple's new PowerPC systems will look like real performers. There won't be a question of how well they run current Macintosh software: almost every company that makes Mac software says that its software works on PowerPC today, often at least twice as fast as top-of-the-line Macintoshes. The transition to PowerPC-based systems will be almost painless, particularly if the user is already running under System 7.1.

Apple's reliance on PowerPC is also becoming clear when you look at its near-abandonment of Bedrock, the programming environment that was supposed to help developers create both Mac and Windows programs at the same time. This lofty goal, long sought by many companies, seems to be getting further from the reach of many developers.

Apple has downgraded its firm support of Bedrock, which still hasn't even shipped in full beta. It appears that Apple is abdicating the cross-platform market, stranding many companies that tied their hopes to Bedrock after Apple made such a firm commitment more than a year ago. It is likely that Apple feels that its money is best spent on getting developers to convert their 68000-based code to native PowerPC code so that its programs run even faster.

MANY of the company's competitors are considering challenging the patent by showing that the concepts covered in the patent were known and discussed before Compton's released its software.

This is not to say that Apple is supporting its developers with tools for the PowerPC: it isn't. In fact, only a few have gotten very far with their ports to native PowerPC code. There are many reasons that developers are slow to port their software to PowerPC: they don't need to do the port, given how well even early PowerPC systems will run their software; they are busy adding a host of new "strategic features" that Apple has been touting for six months, such as OpenDoc (Apple's answer to Microsoft's OLE), standardized drag-and-drop, QuickDraw GX (an extended graphics library), AppleScript, and so on; they are trying to convert their software to Microsoft Windows so that they can have access to a much larger market. Apple's lateness with delivering Bedrock has certainly made this harder for everyone.

Even without native PowerPC applications, Apple is assured of a fair amount of success with the new systems this year, just as Microsoft was assured of early success with Windows NT. The difference is that Apple is committed to manufacturing PowerPC systems exclusively within a few years, while Microsoft will continue to develop MS-DOS and non-NT Windows. ■

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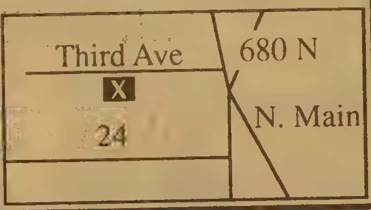

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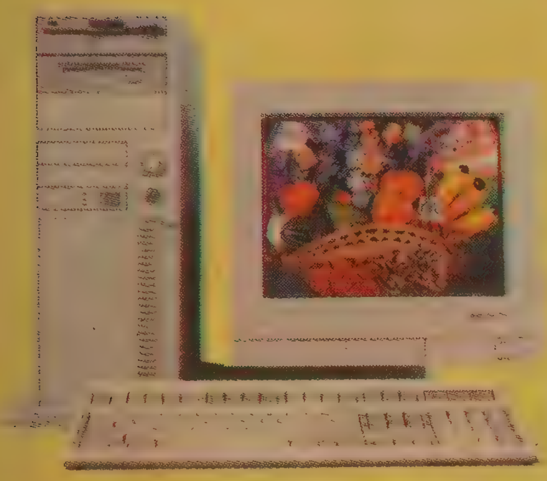

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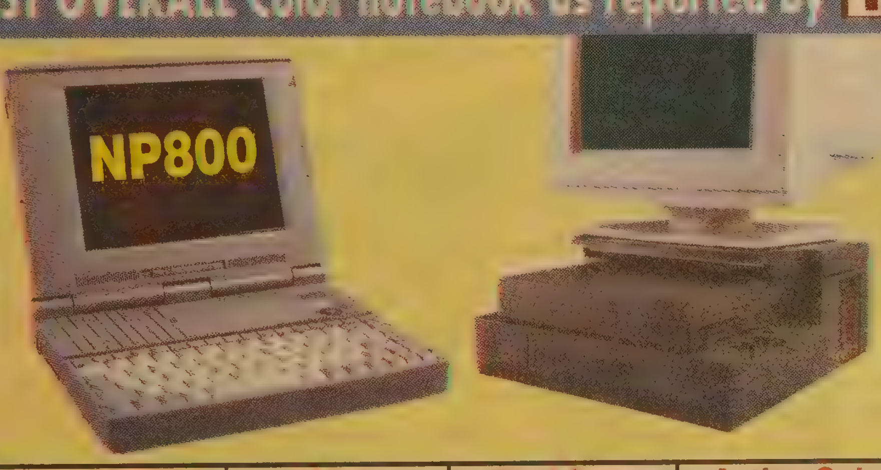

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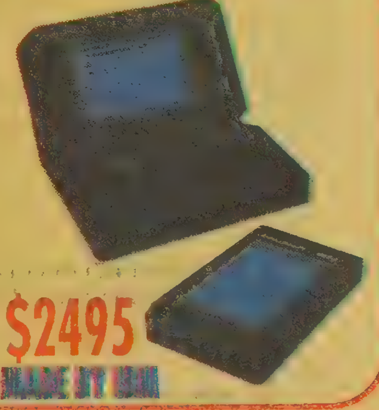

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AST Research was a strong performer in the hardware sector as its shares rose 34.78% to end at $23.25. AST recently signed an agreement with Intelligent Electronics to speed up customer deliveries and respond to increased product demand. According to the agreement, Intelligent will offer AST's full line of desktop, file server, and mobile computers to its entire network of resellers. In other news, AST was raised to an intermediate "above average" from "neutral" by analyst Melinda Reach of Merrill Lynch & Co.

Dell Computer Corp. recently reported unexpectedly strong earnings, only a quarter after reporting its first loss as a public company. Dell's third-quarter earnings of $12 million, or 26¢ a share, were more than five times analysts' expectations. Revenue rose 33% to $757.3 million in the third quarter, up from $570 million in the same quarter a year ago. Increased desktop computer and server sales were the strongest contributors to the revenue increase. Following the unexpected results, Dell was raised to a medium-term "neutral" investment rating from "below average" by Merrill Lynch & Co. analyst Michele S. Preston. Shares of Dell Computer skyrocketed 26.49% to end the session at $23.88.

Shareholders of Tandy Corp. were rewarded with a 28.15% increase after the company announced that it will sell the common stock of its subsidiary, O'Sullivan Industries, in an initial public offering. The spin-off of O'Sullivan, which makes ready-to-assemble furniture, will substantially complete Tandy's plan to shed its manufacturing businesses. The proceeds of the offering will be used to fund retail store expansion, reduce debt, and repurchase shares. Tandy ended at $48.38.

Xerox shares surged after the company announced that it will cut more than 10,000 jobs, or 10% of its workforce, close plants, and take charges totalling $854 million. Investors viewed the restructuring as a sign that management is continuing to focus its efforts on aggressive cost-cutting. Analysts were also positive on the news, as Curt Rohrman at CS First Boston raised Xerox to "buy" from "hold," and Matt Diserio at PaineWebber Inc. rated the company as "attractive." The news, which sent the Xerox to a 52-week high of $90 during the period, pushed shares to a closing mark of $88.63, up 20.37%. ■

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OTC	Microsoft	MSFT	83.00	80.50	–2.50	–3.01	25	0.00	0.00	98.00	70.38
OTC	Novell	NOVL	19.13	20.13	1.00	5.23	–	0.00	0.00	35.25	17.00
OTC	Oracle	ORCL	32.13	34.88	2.75	8.56	59	0.00	0.00	37.75	9.44
OTC	Software Publishing	SPCO	7.13	7.50	0.38	5.26	–	0.00	0.00	14.50	5.50
OTC	Symantec	SYMC	20.00	15.63	–4.38	–21.88	–	0.00	0.00	20.50	9.25
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OTC	Apple	AAPL	28.38	29.50	1.13	3.96	46	0.48	1.63	65.25	22.00
OTC	AST Research (H)	ASTA	17.25	23.25	6.00	34.78	–	0.00	0.00	25.50	12.75
NYS	Commodore	CBU	3.25	3.38	0.13	3.85	–	0.00	0.00	7.75	2.50
NYS	Compaq (H)	CPQ	63.38	74.25	10.88	17.16	15	0.00	0.00	74.50	41.75
NYS	Digital Equipment	DEC	36.50	35.38	–1.13	–3.08	–	0.00	0.00	49.25	30.38
OTC	Dell	DELL	18.88	23.88	5.00	26.49	–	0.00	0.00	49.88	13.50
NYS	Hewlett–Packard	HWP	73.00	77.88	4.88	6.68	17	1.00	1.28	89.25	64.38
NYS	IBM	IBM	44.00	59.75	15.75	35.80	–	1.00	1.67	59.75	40.63
NYS	Silicon Graphics	SGI	22.56	22.75	0.19	0.83	33	0.00	0.00	23.38	11.75
OTC	Sun Microsystems	SUNW	24.13	27.13	3.00	12.44	16	0.00	0.00	41.00	21.13
NYS	Xerox (H)	XRX	73.63	88.63	15.00	20.37	–	3.00	3.39	90.00	69.88
NYS	Tandy (H)	TAN	37.75	48.38	10.63	28.15	32	0.60	1.24	48.38	24.63
	CPU'S										
NYS	Advanced Micro Devices	AMD	20.13	17.88	–2.25	–11.18	7	0.00	0.00	32.88	17.00
OTC	Intel	INTC	63.00	58.00	–5.00	–7.94	12	0.20	0.34	74.50	42.50
NYS	LSI Logic	LSI	15.00	14.13	–0.88	–5.83	15	0.00	0.00	19.25	10.25
NYS	Motorola (H)	MOT	105.88	87.50	–18.38	–17.36	28	0.44	0.50	107.50	48.75
	COMMUNICATIONS										
NYS	AT&T	T	59.13	54.63	–4.50	–7.61	18	1.32	2.42	65.00	49.38
NYS	BellSouth Corp. (H)	BLS	61.88	57.63	–4.25	–6.87	17	2.76	4.79	63.88	50.38
OTC	MCI	MCIC	28.00	26.50	–1.50	–5.36	22	0.04	0.15	29.88	18.81
NYS	Northern Telecom	NT	27.63	29.38	1.75	6.33	–	0.36	1.23	46.00	21.38
NYS	Pacific Telesis (H)	PAC	54.63	56.38	1.75	3.20	26	2.16	3.83	59.25	43.25

KEY: NYS = NEW YORK ASE = AMERICAN OTC = OVER THE COUNTER
(H) = NEW HIGH REACHED IN PERIOD (L) = NEW LOW REACHED IN PERIOD
Note: Silicon Graphics completed a 2–for–1 stock split on 12/15/93, Oracle completed a 2–for–1 stock split on 11/08/93

MARKET DIARY:

ADVANCES	17
DECLINES	15
UNCHANGED	0
NEW HIGHS	9
NEW LOWS	1

MOST ACTIVE ISSUES:

LARGEST DOLLAR GAINER	IBM	$	15.75
LARGEST DOLLAR LOSER	Motorola	$	–18.38
LARGEST PERCENTAGE GAINER	IBM		35.80 %
LARGEST PERCENTAGE LOSER	Symantec		–21.88 %

	CLOSE 10/18/93	CLOSE 12/17/93	NET CHANGE IN PERIOD	PERCENT CHANGE IN PERIOD
MICROTIMES STOCK INDEX	4473.13	4644.25	171.12	3.83
DOW JONES INDUSTRIAL AVERAGE	3642.31	3751.57	109.26	3.00
STANDARD & POOR'S 500 INDEX	468.42	466.38	–2.04	–0.44
N.Y.S.E. COMPOSITE	260.00	257.79	–2.21	–0.85
NASDAQ COMPOSITE	782.91	759.23	–23.68	–3.02

CLOSING QUOTES FOR GRAPH:

DATE	MICRO TIMES	DOW JONES
04/29/93	4074.63	3425.12
05/27/93	4554.50	3554.83
06/24/93	4266.52	3490.61
07/22/93	4072.42	3525.22
08/23/93	4264.70	3605.98
09/17/93	4212.67	3613.25
10/18/93	4473.13	3642.31
12/17/93	4644.25	3751.57

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Who's Buying Our Government?

Computerizing Campaign-Finance Disclosures

BY JIM WARREN

These columns concern what isn't, but could be—no technological breakthroughs needed. All it takes is time and effort.

HIDDEN IN PLAIN VIEW

For years, local, state, and federal political candidates and campaign organizations have been required to file detailed disclosures of their campaign finances and potential conflicts of interest. But these have been paper filings—implementing the "hide in plain sight" technique.

Example: typical financial disclosures for a single major candidate in a California gubernatorial race may be a stack of paper over four feet high. And it costs ten cents a page to get a copy (and there's been a proposal to increase that to thirty cents per page!).

REALIZABLE FANTASIES

Even if you can afford a copy—just *try* to analyze it.

COMPUTERIZED DATA IS ACCESSIBLE DATA

To make campaign disclosures *useful*, a project has recently begun to mandate that all state (and perhaps local) political campaign disclosure information that is "significant" be filed in digital form and made available upon request to anyone, on diskette and/or online. "Significant" might be defined as campaign receipts exceeding some dollar threshold.

This project is a logical follow-on to the successful 1993 effort that made comprehensive state legislative information and statutes available via the public computer nets, without charge by the state. (The law took effect January 1, 1994.)

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As with the legislation-online bill, I have agreed to provide a proposal explaining how—from a technical standpoint—computerized campaign filings and disclosures can be done for (*I* think) little or no increased expense for the receiving agency and, in most cases, no additional cost or hassle for "significant" campaign operations. In fact, it appears that there may be cost and time savings for both—and certainly improved utility for the public.

WIDESPREAD INTEREST

Two semi-announced candidates (Assembly Member Jackie Speier and Acting Secretary of State Tony Miller) for the open Secretary of State's office—which handles filings for state races—have had staff members contact me and are awaiting copies of the proposal.

Furthermore, a campaign disclosure reform bill is already partway through the legislative process, and the bill author's staff have also called and are awaiting copies of the proposal. If they like it, they are likely to amend appropriate components of it into the bill, SB758 by state Senator Tom Hayden.

In early December, at the invitation and guidance of the San Mateo County Clerk and Registrar of Voters, Warren Slocum, I outlined the proposal to ten county clerks and registrars—all we had time to buttonhole in unplanned meetings during a Sacramento "new laws" conference. Most responses were actively positive; two were politely positive; none was even slightly opposed. (It probably helped that Slocum is a past president of the California Elected Officials Association and has actively pursued modernization and cost-effective improved services for his own county operations. There are fifty-eight counties in California.)

At the state level, a coalition of the "usual suspects" is already coalescing to support the effort to mandate computerized campaign disclosures—public-interest and open-government advocates such as California Common Cause (916/443-1792), etc. It appears certain that the spectrum of supporters will include newspaper publishers, journalists, environmental groups, utilities watchdogs, educators, and numerous similar groups.

LOCAL IMPLEMENTATION ALREADY UNDERWAY

The City and County of San Francisco is even further along. In 1993, they passed an ordinance (#131-93, May 17th) mandating that local candidates and campaign organizations that collect $5000 or more *must* file disclosures in computerized form—in addition to filing their already-required paper disclosures.

San Francisco's Registrar of Voters Germaine Wong, several of her key staff, and I had a lengthy working session in December addressing implementation details. It appears that they will implement their ordinance in a manner compatible with my then-tentative proposal, and I am certainly picking their brains for insights and ideas—a mutually productive sharing.

Wong mentioned that, as far as she knows, San Francisco appears to be the first jurisdiction in California to mandate computerized filings and have implementation already in process. (Some other counties are apparently scanning the paper filings and storing them as digitized images for computer retrieval. Better than paper, but all you can do is read 'em. No computer-assisted analysis.)

continued on page 32

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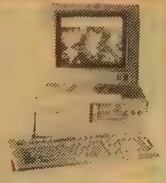

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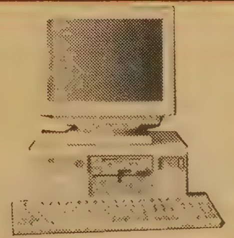

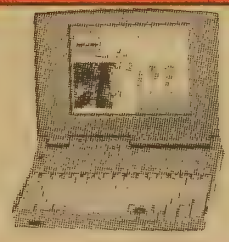

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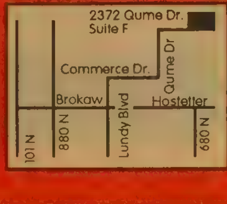

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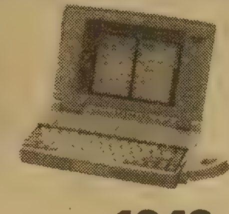

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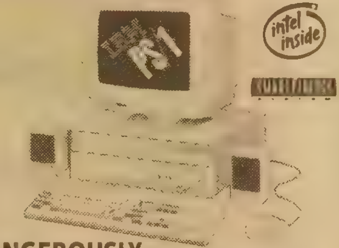

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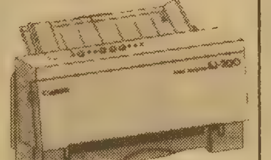

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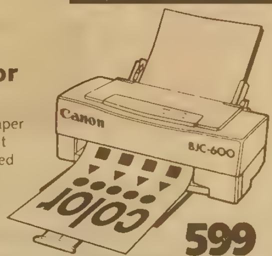

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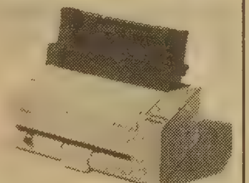

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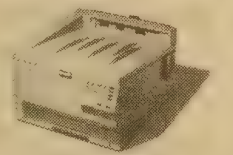

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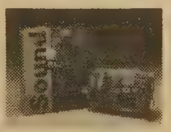

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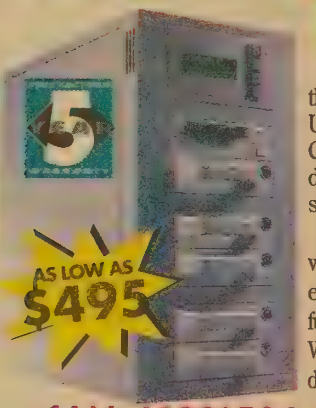

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NAFTA's Strange Bedfellows—It's Only The Beginning

BY RICH KARLGAARD

If its implications weren't so serious, the NAFTA debate would have been laughable for producing such odd bedfellows. Who would have imagined a dance card like this?

* FOR: *The New York Times* and the *Wall Street Journal*; Anthony Lewis and William F. Buckley; Al Gore and Empower America.

* AGAINST: Ross Perot and Jesse Jackson; Roger Milliken and Ralph Nader; Pat Buchanan and the Sierra Club.

What this shows is that the range of political opinion in the US is not always spread along a single axis of left to right. I believe there is another axis ascendant: authoritarian/libertarian.

Try this exercise. Draw a left-to-right line across a page. Then draw a vertical line from top to bottom, labeling it Authoritarian on top, Libertarian on bottom. You have just created a grid with four quadrants. Politically speaking, it should look like this:

* Upper left is left/authoritarian. Here dwell the Communist Party, AFL-CIO, NEA, parlor Maoists like Michael Lerner and European-style social democrats like Hillary Rodham Clinton.

* Upper right is right/authoritarian. Augusto Pinochet, Pat Buchanan and Ross Perot call it home.

* Lower left is left/libertarian. This quadrant is least represented in government today, even though many college-educated baby boomers (particularly those without children) would place themselves here. Mavericks like Jerry Brown or Bob Kerrey often start here, then move out or drop out when they can't build a coalition—the perennial problem of politicians in this quadrant. In the same quadrant are readers of *Rolling Stone* magazine and donors to the ACLU. Tellingly, most software designers I know would claim a home here.

Put this kind of expanding power in ordinary people's hands, and authoritarian regimes will topple, one by one.—Rich Karlgaard

Photo credit: Apple Computer, 1984 commercial introducing the Macintosh.

* Lower right is right/libertarian. Most *Wall Street Journal* editorial page readers are comfortable here. Other neighbors include Ronald Reagan, *National Review*, *Forbes* and Empower America.

Where's Bill Clinton? Our young president has always been a leftist. His real problem is that he can't decide whether he is authoritarian, like his wife, or libertarian like the New Democrat he campaigned as for president. On NAFTA, Clinton was his old campaigning self. (Not so on much else, regrettably.)

Here is the point: NAFTA was largely supported by libertarians and largely opposed by authoritarians. And NAFTA won't be the only example of this. As the world speeds ever faster into the information age, look for more skirmishes fought along the authoritarian/libertarian axis.

The source of the conflict is this: Authoritarians believe in the goodness of command-and-control. Politicians of this stripe—left and right—trust the state and its apparatus to mold human beings into better human beings. Force, implied, threatened or used, inevitably is necessary. Libertarians, by contrast, trust in the individual's ability to make his own best destiny.

How does politics relate to the information age? Simply this. The microprocessor, software, and communications technologies—building blocks of the information age—are tools that empower libertarians and wreak havoc with authoritarians.

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There is no better predictor to describe the coming authoritarian/libertarian battles than the example of what happened in the computing world during a fifteen-year period from 1977 to 1992.

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Rich Karlgaard is the editor of Forbes *ASAP. He can be reached through MCI Mail: 509-6930.*

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of computing power sat collectively on the world's desktop (and laptop) computers. Moore's Law laid waste to command-and-control data processing centers inside of corporations.

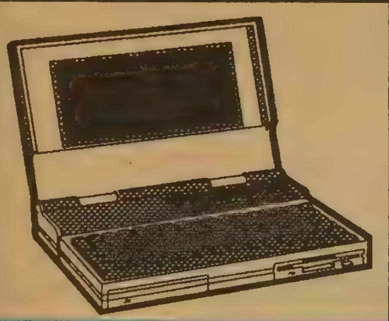
Moore's Law (named after Gordon Moore, the Intel cofounder who predicted that chips would double in performance every eighteen months) will rout every authoritarian regime it encounters. Yes, every one: from mainframe computers, to monopolies and cartels, to the tin pot Napoleons in government, trade unions and academe.

By 1996 Moore's Law will have the power of 1993's top mainframe contained in a desktop box for $3000. By decade's end, that power will be in your set-top box (once known as your television) and telephone. Communications bandwidth will grow at a rate even faster than Moore's Law. Fiber optics has an almost infinite capacity, assuming the development of such enabling technologies as photon amplifiers and frequency tuners. But while we're waiting for that, advances in digital signal compression (again, thank Moore's Law) will turn coaxial cable and even copper into six-lane interstate highways of data. Wireless may hold the greatest promise of all. Each year, Moore's Law—literally in the form of digital signal processors, analogously in a grid of microcells—will ensure that higher and higher frequencies in electromagnetic spectrum can be turned into ocean-wide channels of data.

NAFTA was largely supported by **libertarians** and largely opposed by **authoritarians**. As the world **speeds ever faster** into the information age, look for more **skirmishes** fought along the authoritarian/libertarian axis.

Put this kind of expanding power in ordinary people's hands, and authoritarian regimes will topple, one by one. Before the decade's end, home and private schooling on computers will rout the NEA. Lightning fast library searches on massively parallel servers fed by fiber optic pipes will trash the cost structures of many professional cartels, including law and perhaps even medicine. And corporate organizations that are based on hierarchies, job descriptions and credentialism will be left gasping when passed by nimbler rivals harnessing workgroup software, teams of virtual experts and just-in-time learning.

In the age of information, those who cling to authoritarian command-and-control structures are destined to lose. But beware, in the meantime, they'll try their best to make us miserable. ■



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continued from page 24

FOR A GOOD TIME . . .

This column will report ongoing details—though often too late to assist readers' most effective legislative participation.

To receive online updates and action alerts—which *do* arrive quickly enough to allow citizen input to the Legislature when it can have greatest impact, send your email address to *jwarren@well.sf.ca.us*—then, as I know more, you'll know more. (Once I have the implementation proposal completed, it'll be available online, and I will publish how to receive a copy by SASSE—self-addressed, stamped, snailmail envelope.)

Disclaimer: As with the legislation-online project, I have no business or financial interest in this—but I have a *great* civic interest in it. Anyway, it beats the hell outa hanging out at the local bar.

TECHNO-CIVIC QUICKIES

- Every federal congressional district in the nation purportedly has a library designated as the district's federal depository library—where copies of federal public records are made locally available. Many also serve as depositories for copies of state and/or local-government public records. Why not equip those depository libraries with ftp file-servers for often-local dial-up online access to computerized federal records? ("ftp" means "file transfer protocol," a standard mechanism for copying files between computers on the Internet.)
- You may not like the idea of "direct democracy"—with its potential for legislation by ill-informed masses manipulated by Madison Avenue. But how about voting by telephone, instead of trudging off to wait in a line at some distant voting booth on election day? Interesting idea—with numerous complications ripe for technological solution. (Warren Slocum mentioned someone who has a proposal for how to implement it; more details later.) ■

> You may not like the idea of **"direct democracy"**—with its potential for legislation by **ill-informed masses** manipulated by Madison Avenue. But how about **voting by telephone?**

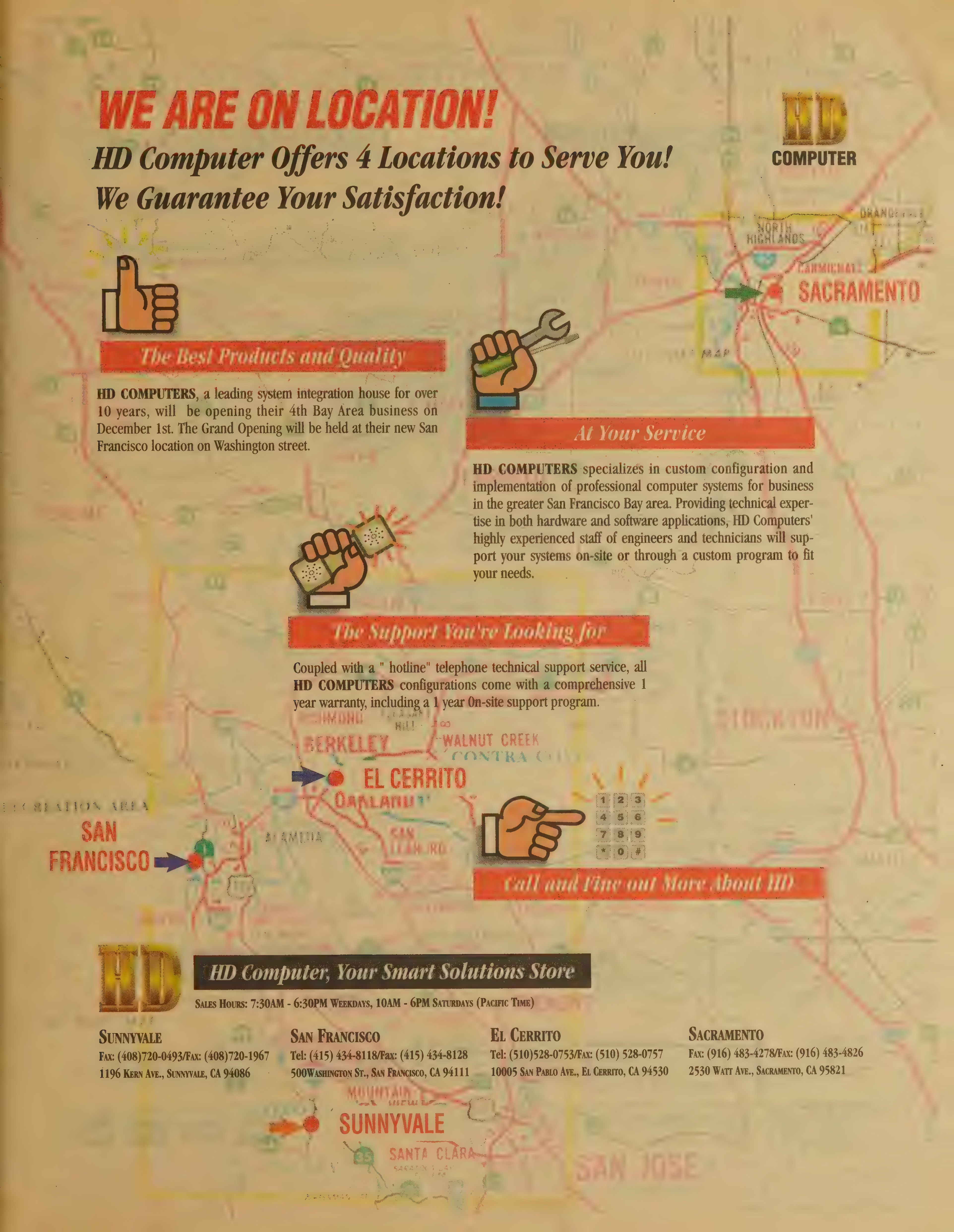
THE HORSE'S MOUTH

Jim Warren will speak about "Modern (Electronic) Access to Government" before the Commonwealth Club in San Francisco, May 5th at 5 pm (415/597-6700).

He will discuss "Realworld Civic Networking" at a meeting of the IEEE Society on the Social Implications of Technology, Silicon Valley Chapter, Feb. 10th at 7:30 pm (415/948-9275 or dpaull@infoserv.com).

Warren founded InfoWorld, Wireless Digital, Initiative, Inc., and one of the nation's largest public microcomputer conventions. He was founding host of PBS's Computer Chronicles, *founding editor of* Dr. Dobb's Journal, *and has chaired various trade and professionals' organizations. He holds graduate degrees in computing (Stanford), medical information science (UC Medical Center), and mathematics & statistics. He has been a computer professional since 1968, and was a mathematics teacher and professor for ten years before that.*

He organized and chaired the landmark First Conference on Computers, Freedom & Privacy (1991), was one of the first to receive the Electronic Frontier Foundation Pioneer Award (1992), and led the recent successful effort to make state legislation and statutes available via the public nets without state charge. He is also a member of Autodesk's board of directors.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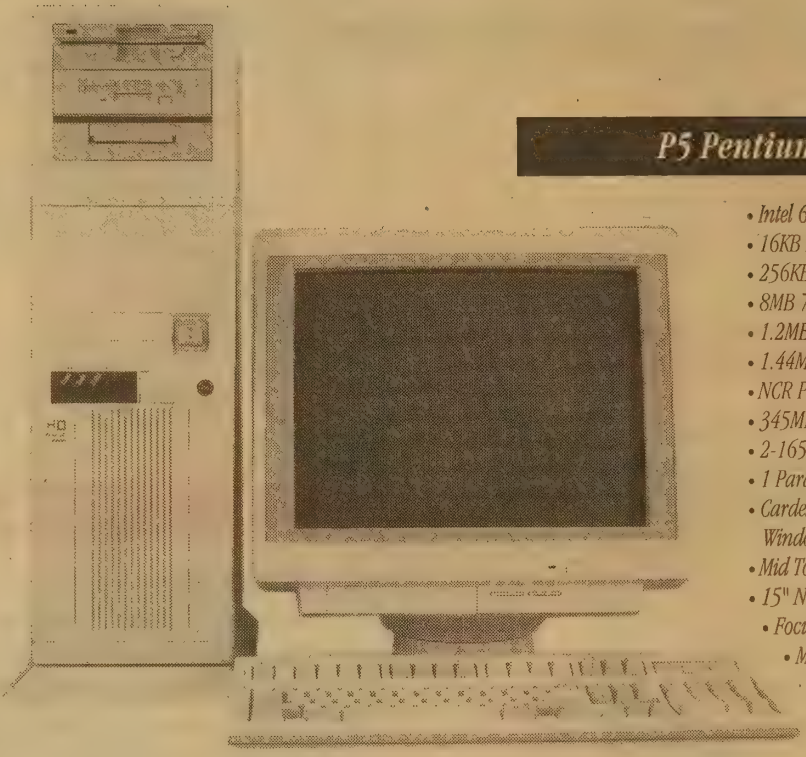

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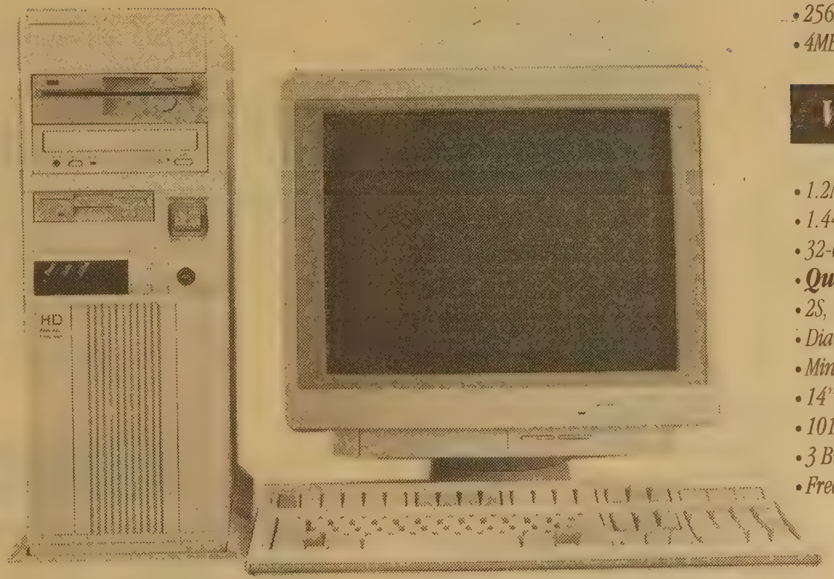

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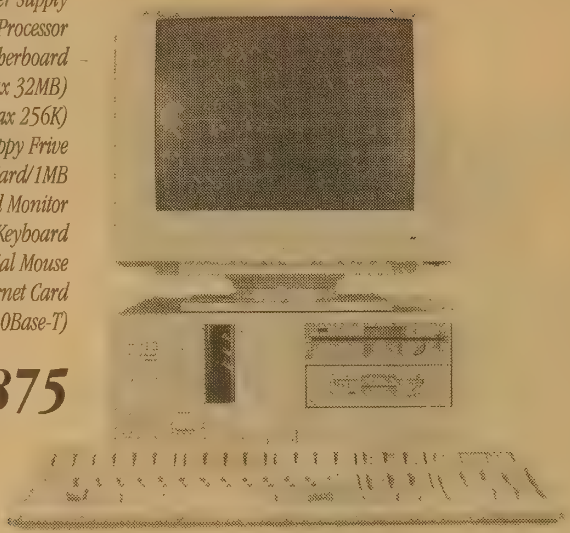

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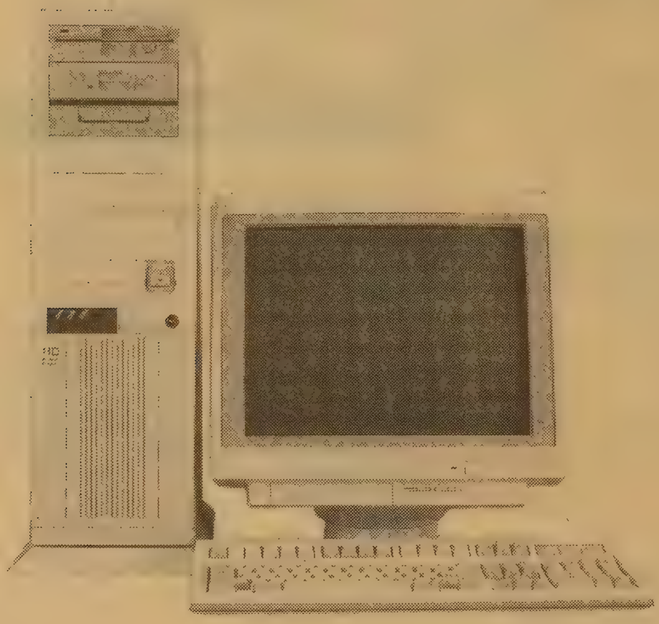

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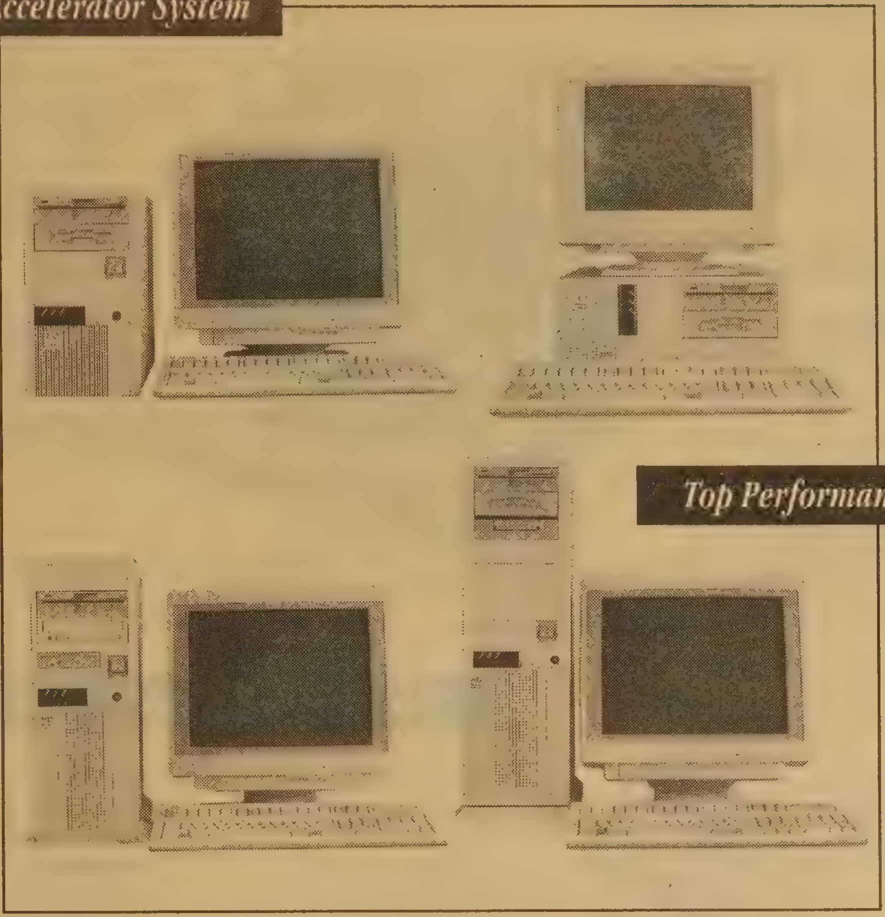
VISA MasterCard DISCOVER AMERICAN EXPRESS

GENERAL/BEST BUY SYSTEM

ISA-486 Windows Accelerator System

- Intel 486 Processor
- 128KB Cache (Max. 256KB)
- 4MB RAM (Max. 32MB)
- 1.2MB FDD
- 1.44MB FDD
- 130MB IDE HDD
- 2H/2F IDE Disk Controller
- 2S, 1P, 1G Ports
- 16-bit Windows Accelerator Card/1MB
- Mini-Tower Case w/ 200W Power Supply
- 14" Non-interlaced Monitor, .28 dpi
- 101-key Enhanced Keyboard
- 3 Button Serial Mouse
- Free Software Option

SX-25	**$1035**
SX-33	**$1065**
DX-33	**$1195**
DX-50	**$1295**
DX2-66	**$1395**



- Intel DX-486 Processor
- ZIF Socket OverDrive Ready
- 8KB Internal Cache
- 256KB External Cache
- 4MB RAM (Max. 128MB)
- 1.2MB FDD
- 1.44MB FDD
- 32-bit EISA SCSI II Controller
- 2 16550 UART High Speed Serial Port
- 1 Parallel Port
- 345MB SCSI HDD
- Cardex ET-4000 W32 VL-B Graphic Accelerator Card/1MB
- Mid Tower Case w/ 250W Power Supply
- 14" ViewSonic 6E Non-interlaced Monitor

Top Performance EISA/VESA System

- 101-key Keytronic Keyboard
- 3 Button Serial Mouse
- Free Software Option

DX-33	**$1995**
DX-50	**$2110**
DX2-66	**$2195**

Free Software Option:

- MS DOS 6.0 (with system only)
- MS Windows 3.1 (with system only)
- PFS: Windows works
- PFS: Publisher
- CD Title: Toolworks Encyclopedia
- CD Title: US Atlas
- CD Title: Carmen San Diego

HD 386 Systems Below $900

- 4MB RAM (Max. 32MB)
- 1.44MB FDD
- 130MB IDE HDD
- 2H/2F IDE Disk Controller
- 2S, 1P, 1G Ports
- 16-bit SVGA Card/1MB
- Mini Tower Case w/ 200W Power Supply
- 14" SVGA Monitor, .39 dpi
- 101-key Enhanced Keyboard
- 3 Button Serial Mouse

386SX-33	**$825**
386DX-33/64K Cache	**$855**
386DX-40/64K Cache	**$855**

HD Computer continues to offer leading, high-performance system configurations for any application. Custom configuration. Lifetime technical support. 30-day money back guarantee. No other Bay Area system integration house can boast this type of service and support.

New EISA/VESA systems, 386 systems and Windows Accelerator systems are only a few of the many system configurations now offered by HD Computer. Whether for business or at home, HD will custom the computer systems to your specifications.

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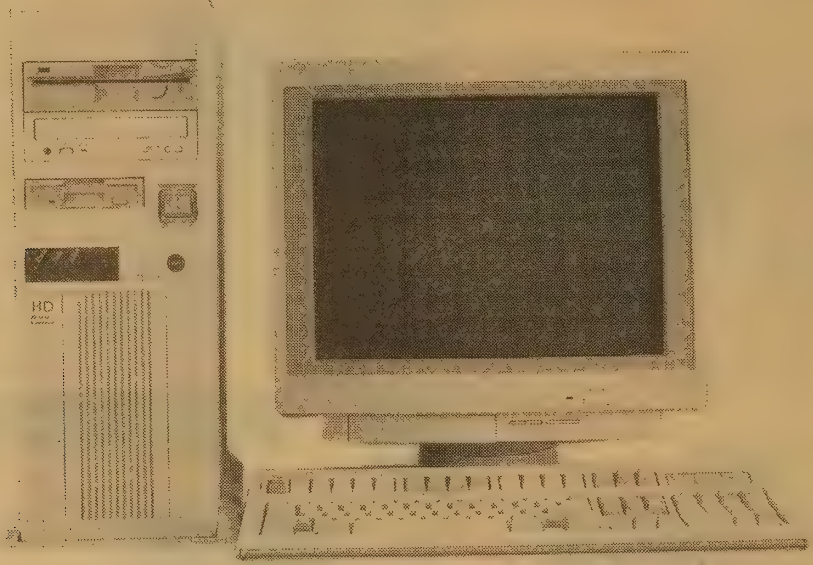
MULTIMEDIA

Four CD-ROM Package Options for You to Convert Your Computer Into The Multimedia World!!



Multimedia has definitely landed! If you're shopping for fully featured, high-performance Multimedia Systems... you've come to the right place. Capture new levels of creativity, exciting presentations, not to mention education, entertainment and video, at home or in the office.

The powerful, new Intel 486 PCI Multimedia system from HD Computer is available in four different configurations. HD's new Multimedia system offers the ultimate in performance and capability with an ability to expand. Upgradeable to Pentium Overdrive, this ready-to-go system comes packed with an impressive list of functions and features.

HD Computer brings Multimedia to your fingertips.

Free installation specific configuration

- *NEC triple speed internal CD ROM*
- *Pro Audio studio 16*
- *Microsoft works MPC*
- *Microsoft bookshelf MPC*
- *Compton's encyclopedia*

$796

- *Toshiba double speed internal CD ROM*
- *Pro Audio spectrum 16*
- *Microsoft works MPC*
- *Microsoft bookshelf MPC*
- *CD game package II*

$569

- *Panasonic double speed internal CD ROM*
- *Gallant 5000 16 bit sterio sound card*
- *Speaker and Microphone*
- *Microsoft works MPC*
- *Microsoft bookshelf MPC*
- *Toolworks Encyclopedia*
- *King's quest*

$425

- *Internal Single Speed CD ROM*
- *Gallant 4000 sound card/Interface*
- *Speaker and Microphone*
- *Toolworks Encyclopedia*
- *U.S. Atlas*
- *Playing with Language English*
- *CD game package II*

$345

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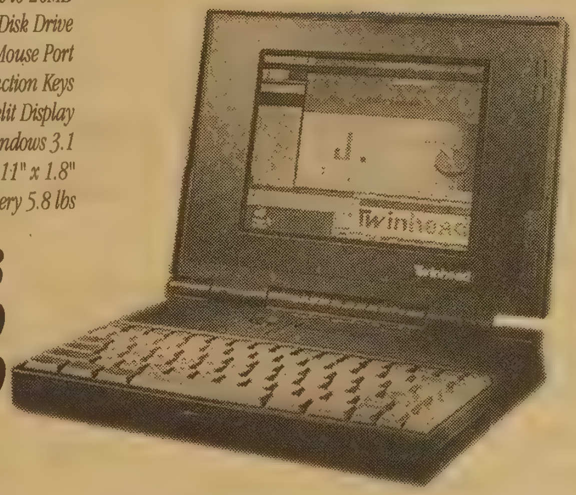
NOTEBOOK

Twinhead Powerful Mono Notebook

- *Intel 486DX CPU*
- *4MB RAM Expandable to 20MB*
- *1.44MB Built-in Floppy Disk Drive*
- *One Serial Port, One Keyboard/Mouse Port*
- *84 Keys Keyboard with 12 Function Keys*
- *Monochrome, 64 Shade Sidelit Display*
- *MS DOS 6.0, MS Windows 3.1*
- *Physical Dimensions 8.5" x 11" x 1.8"*
- *Weight with Battery 5.8 lbs*

486DX-33 w/130MB HD	***$1988***
486DX-33 w/200MB HD	***$2130***
486DX2-66 w/200MB HD	***$2590***



- *Intel 486DX CPU*
- *4MB RAM Expandable to 20MB*
- *1.44MB Built-in Floppy Disk Drive*
- *One Serial Port, One Keyboard/Mouse Port*
- *84 Keys Keyboard with 12 Function Keys*
- *256 Color Display, Active Color Matrix*
- *Video Card w/512K RAM*
- *MS DOS 6.0, MS Windows 3.1*
- *Physical Dimensions 8.5" x 11" x 1.8"*
- *Weight with Battery 6.3 lbs*

Twinhead Brilliant Color Notebook

486DX-33 w/130MB HD	***$3555***
486DX-33 w/200MB HD	***$3695***
486DX2-66 w/200MB HD	***$4155***

Twinhead 4 Pounds Powerful Subnote

- *2MB RAM Expandable to 8MB*
- *1.44MB External Floppy Disk Drive*
- *85MB IDE Hard Disk*
- *One Serial Port, One Keyboard/Mouse Port*
- *79 Keys Keyboard*
- *64 Gray Shades VGA Display*
- *PCMCIA Slot*
- *Built-in 2-Button Trackball*
- *MS DOS 6.0, MS Windows 3.1*
- *Physical Dimensions 7.1" x 10" x 1.6"*
- *Weight with Battery 4 lbs*

486SLC-33 Only ***$1395***

- *Intel 486SX-25/SX-33 CPU*
- *4MB RAM Expandable to 20MB*
- *130MB IDE Hard Disk*
- *One Serial Port, One Keyboard/Mouse Port*
- *One External VGA Connector*
- *One PS II Keyboard/Mouse Connector*
- *85 Keys Keyboard with Inverted " T" cursor Keys*
- *Build-in 1.44 MB Floppy Disk Drive*
- *Build-in 16mm Trackball*
- *Preloaded with Microsoft DOS and Windows*
- *11" (W) x 8.5" (D) x 1.9" (H)/5.5lbs*

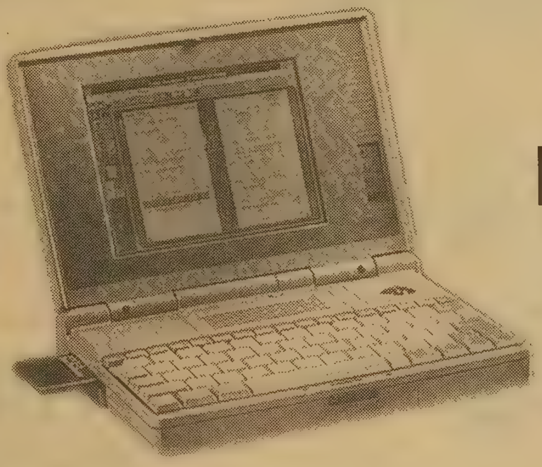
MTC-4020 Mono/Color Notebook

MTC-Mono	***$1265***
MTC-Color	***$1815***

MNB-4010 Subnote

- *Intel 486SX-25 CPU*
- *4MB RAM Expandable to 20MB*
- *2 PCMCIA Level II or Single Level III Slots*
- *Two Serial, One Parallel Connector*
- *One External VGA Connector*
- *One PS II Keyboard/Mouse connector*
- *79 Keys Keyboard with Inverted " T" cursor Keys*
- *Build-in 16mm Trackball*
- *Windows Sound System Compatible Sound Option*
- *Preloaded with Microsoft DOS and Windows*
- *Physical Dimensions 10.5" x 7.8" x 1.5"*
- *Weight : 4lbs*

MNB 80MB HD	***$1375***
MNB 130MB HD	***$1435***



Ultraportable PC/ Quaderno 33

- *The Most Portable*
- *The Most Functional*
- *The Most Compatible*
- *The Most Open Solution*
- *8.2" (W) x 5.8"(D) x 1.6" (H)/2.9lbs*
- *4MB RAM Expandable to 12MB*
- *Flash bios ROM/60MB Hard Disk*
- *Build-in Trackball*
- *93 Keys Keyboard, PS II Compatible*
- ***Audio recording and playback***
- ***Multimedia PC Compatible***
- ***Internal Speaker with Volume Control***
- *One PCMCIA Slot*
- *One Serial, One Parallel port*
- *External VGA Connector*
- *External Keyboard Mouse Connecotr*
- *External Microphone, Headphone Connector*

Preloaded Software:

- *Microsoft DOS 5.0 and Windows 3.1*
- *Server Link, Microsoft works for Windows*
- *Organizer Lotus*
- *Voice Processing Manager*
- *On-Line Product and user Documentation*

$1675

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Hard Drives

CONNER

IDE Hard Disk

250MB, IDE, 14ms $219
340MB, IDE, 13ms $255
540MB, IDE, 12ms $495

SCSI Hard Disk

1.37GB, SCSI II, 3.5x1, Low Profile, 9ms $999

Capacity	M/N	Cache	Speed	Size	Internal	External
170MB	CP30170	64K	17ms	3.5x1	$229	$349
212MB	CP30200	256K	12ms	3.5x1	$289	$399
540MB	CP30540	256K	12ms	3.5x1	$529	$639
1.0GB	CPF1060S	256K	10ms	3.5x1	$999	$1119

TOSHIBA

- **Superior Quality and Value**
- **5-Year Factory Warranty**

877MB, SCSI II, 3.5", 12ms $699
1.06GB, SCSI II, 3.5", 12ms $745

WESTERN DIGITAL

250MB, IDE, 13ms, 2 Yr. Warranty $225
340MB, IDE, 12ms, 3 Yr. Warranty $285
420MB, IDE, 13ms, 3 Yr. Warranty $385
540MB, IDE, 12ms, 3 Yr. Warranty $529

Maxtor

IDE

131MB, IDE, 14ms, 1 Yr. Warranty $169
245MB, IDE, 15ms, 1 Yr. Warranty $219
345MB, IDE, 14ms, 2 Yr. Warranty $265
540MB, IDE, 8.5ms, 256K Cache, 2 Yr. Warranty $615

SCSI

245MB, SCSI, 15ms, 2 Yr. Warranty $235
345MB, SCSI, 14ms, 2 Yr. Warranty $335
540MB, SCSI, 8.5ms, 256K Cache, 2 Yr. Warranty $615
1.2GB, SCSI, 8.5ms, 256K Cache, 2 Yr. Warranty $1295

Quantum

270 MB IDE $229
256K Cache, 3.5X1"

525 MB IDE $549
256K Cache, 3.5X1"

1.2GB SCSI $959

IDE

Capacity	M/N		Speed	Size	Price
85MB	ELS85A	32K	17ms	3.5x1	$159
127MB	ELS127A	32K	17ms	3.5x1	$169
170MB	ELS170A	32K	17ms	3.5x1	$179
240MB	LPS240A	256K	Fast	3.5x1	$229
270MB	LPS270A	256K	Fast	3.5x1	$229
525MB	LPS525AT	512K	Fast	3.5x1	$549

SCSI

Capacity	M/N	Cache	Speed	Size	Internal	External
170MB	ELS170S	32K	17ms	3.5x1	$199	$329
240MB	LPS240S	256K	Fast	3.5x1	$269	$369
270MB	LPS270S	256K	Fast	3.5x1	$Call	$Call
525MB	LPS525	512K	10ms	3.5x1	$549	$669
700MB	PD700	512K	Fast	3.5	$739	$859
1.0GB	PD1050S	512K	Fast	3.5	$869	$979
1.2GB	PD1225S	512K	Fast	3.5	$959	$1079
1.8GB	PD1800S	512K	Fast	3.5	$1299	$1429

Seagate

SUPER DEAL

1.7GB $1299

Fast SCSI-II 3.5" 9ms 5year Warranty

Capacity	M/N	Cache	Speed	Sixe	Int.	Ext.
341MB	ST3390N	256K	12ms	3.5x1	$399	$529
456MB	ST3550N	256K	12ms	3.5x1	$559	$679
525MB	ST3600N	256K	10.5ms	3.5x1	$679	$799
1.05GB	ST11200N	256K	10.5ms	3.5	$949	$1059
1.0GB	ST31200N	256K	9ms	3.5x1	$1089	$1199
1.4GB	ST41651	256K	15ms	FH	$1189	$1389
1.9GB	ST42100N	256K	13ms	FH	$1489	$1689
2.1GB	ST42400N	256K	11ms	FH	$1749	$1949
2.1GB	ST12400N	256K	9ms	3.5	$1969	$2029
2.9GB	ST43400N	512K	10ms	FH	$2299	$2499
2.9GB	ST43401N	512K	Fast Wide SCSI II	5.25	$2499	$2699

FUJITSU

520MB SCSI 3.5" $569

- 3.5" HH Drive
- 12 ms Seek Time
- 240K Read/Write Cache (SCSI)
- 5 Yr. Warranty

SCSI

Capacity	M/N	Cache	Speed	Size	Internal	External
520MB	M2624FA	240K	12ms	3.5	$569	$689
1.0GB	M2694ESA	256K	10ms	3.5	$879	$999
2.0GB	M2654SA	256K	12ms	FH	$1499	$1699

IDE

Capacity	M/N	Cache	Speed	Size	Price
520MB	M2624T	64K	12ms	3.5	$639

• 128MB Removable Optical Diskette • Rewritable • 3.5" Diskette Size of Floppy • Unlimited Storage • Ideal for Data Mobility • Fast Access time and Data Transfer. • ISO Standard.

128MB Rewritable Optical SCSI Drive

Internal Drive

- Bare Optical Drive
- 2511A
- Low Profile, Only 1"
- Fast 30ms Seek Time
- 256K Cache
- 3600RPM

$789

External Drive

- External Optical Drive
- 2511A
- Includes 1 cartridge
- Formatting Software for MAC (Free upon request)

$899

MICROPOLIS

SUPER DEAL

1.75GB $1385

Fast SCSI-II 3.5" 10ms Seek Time 5400 RPM

IDE	Model	RPM	Speed	Size	Internal
1.0GB	MC2210A	5400	10ms	3.5	$969
1.75GB	MC2217A	5400	10ms	3.5	$1489

SCSI

670MB	MC1624	3600	14ms	HH	$729	$849
1,0GB	MC2210	5400	10ms	3.5	$969	$1089
1.0GB	MC2210AV		Audio/Visual		$1099	$1229
1.0GB	MC1598	3600	15ms	FH	$969	$1169
1.4GB	MC1908	5400	11ms	FH	$1699	$1899
1.75GB	MC2217	5400	10ms	3.5	$1389	$1499
1.75GB	MC2217AV		Audio/Visual		$1529	$1639
1.8GB	MC1548	3600	14ms	FH	$1499	$1699
2.0GB	MC1926	5400	11ms	FH	$1899	$2099
3.0GB	MC1936	5400	11ms	FH	$2499	$2699

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Motherboards

Model	Type	Description	Price
P5-MPS	Pentium PCI	3 PCI, 4 ISA Slots, Flash EPROM BIOS, 256K Cache up to 512K, 0MB RAM up to 192MB	$499
S1441	Pentium Local Bus	3 VESA, 8 ISA Slots, 256K Cache up to 2MB, 0MB RAM up to 128MB	$485
486SP3	486PCI Local Bus	3 PCI, 4 ISA Slots, ZIF Socket, 256K Cache up to 512K, 0MB RAM up to 128MB, Built-in PCI SCSI Controller, Built-in IDE Disk Controller, Built-in 2 Serial, 1 Parallel Ports	$439
486SVI	EISA/VESA	8 EISA, 2 VESA Slots, Zif Socket, AMI BIOS, 256K Cache up to 1MB, 0MB up to 256MB	$359
S1437	EISA/VESA	7 EISA, 1 VESA Slots, SIS Chipset, AWARD BIOS, 256K Cache, 0MB up to 128MB	$335
VL-SV2	VESA Local Bus	7 ISA, 2 VESA Slots, SIS Chipset, ZIF Socket, 128K Cache up to 256K, 0MB RAM up to 32MB	$165
VL-CV2	VESA Local Bus	8 ISA, 2VESA Slots, Contaq-A Chipset, ZIF Socket, 128K Cache up to 256K, 0MB RAM up to 32MB	$165
CLT486VLS2	VESA Local Bus	Made in USA, 8 ISA, 2 VESA Slots, Contaq-A Chipset, ZIF Socket, 128K Cache up to 256K, 0MB RAM up to 128MB	$185
MST453SG	Green Mode VESA Local Bus	8 ISA, 3 VESA Slots, SIS Chipset, Zif Socket 128K Cache up to 256KB, 0MB RAM up to 32MB	$185
GVL-CV3	Green Mode VESA Local Bus	7 ISA, 3 VESA Slots, Contaq-A Chipset, ZIF Socket, 128K Cache up to 1MB, 0MB up to 128MB	$195

386SX-33/CPU	$135
386DX-40/64K/CPU	$145
386DX/64K (Motherboard Only)	$105

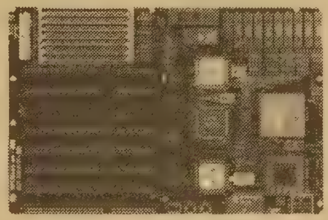
Micronics

VESA Local Bus/256K/DX-33 CPU	$660
VESA Local Bus/256K/DX2-66 CPU	$875
JX30 VESA Local Bus/256K/DX2-66 CPU	$925
EISA VLB/256K/DX-33 CPU	$845
EISA VLB/256K/DX2-66 CPU	$1060

AMI Motherboard

Enterprise III EISA/VESA /256K/486DX-33 CPU	$985
Enterprise III EISA/VESA/256K/486DX2-66 CPU	$1195
Enterprise IV EISA/VESA /256K/486DX-33 CPU	$975
Enterprise IV EISA/VESA/256K/486DX2-66 CPU	$1185
Super Voyager VL-B/256K/486DX-33 CPU	$595
Super Voyager VL-B/256K/486DX2-66 CPU	$855

ORCHID



Orchid

486 VESA Local Bus/256K/DX-33 CPU	$465
486 VESA Local Bus/256K/DX2-66 CPU	$675

Monitors

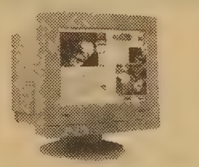
SONY

CPD 1430	14" SVGA	.25 dpi	$569
CPD 1730	17" SVGA	.25 dpi	$999
GDM 17SE1	1600 X 1280	.25 dpi	$1275
GDM2038	20" State of the Art		$2189

14" Mono Monitor			$95
14" VGA Mono Monitor			$119
14" SVGA 1024 X 768 .39 dpi			$219
14" SVGA 1024 X 768 .28 dpi			$245
14" Non-Interlaced SVGA	.28 dpi	1024x768	$259
15" Non-Interlaced SVGA	.28 dpi	1024x768 Flat Screen	$385
17" Non-Interlaced SVGA	.26 dpi	1024x768 Flat Screen	$799

(Low Radiation, IBM, Mac, compatible)

NEC



3FGe 15" 1024x768 @ 60Hz	**$579**
4FGe 15" 1024x768 @ 76Hz	**$685**
5FGe 17" 1024x768 @ 76Hz	**$1079**
5FGp 17" 1280x1024 (with Opticlear)	**$1495**
6FG 21" 1280x1024 @ 74Hz	**$2389**
6FGp 21" 1280x1024 (with Opticlear)	**$2595**

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F550i	17" Non-interlaced 1280x1024, .28 dpi	$969
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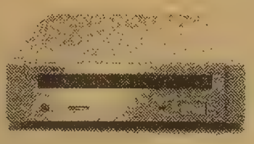

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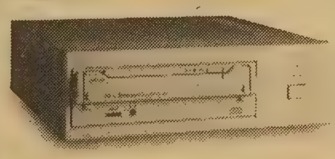

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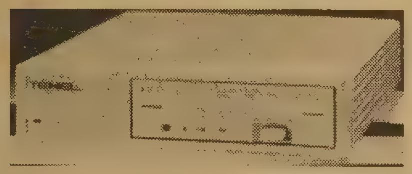

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Portable Tape Backup

On The Go Or In One Location, The Trakker Portable Tape Backup System Brings Safer Computing To Your Laptop

BY ED KAHN

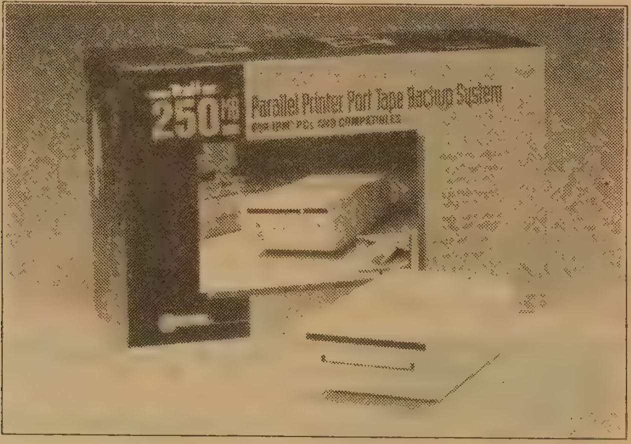
RESOURCES:

Trakker 250MB Tape Backup, $548
Colorado Memory Systems, Inc.
800 S. Taft Ave.
Loveland, CO 80537
1-800-451-4523

LAPTOPS

I can remember the time before I had a tape backup on my desktop computer. Backups were sporadic and time consuming. The net result was that I was not practicing safe computing. It was a big relief when I got my first tape backup unit! Finally, because of the scheduling feature that automates backups if you leave your computer on, I was able to do weekly backups of my entire hard drive and daily backups on all files that had been modified.

When it came to my laptop, however, it was a different story. I generally had copies of my portable files on my desktop machine, so I did not feel pressed to do systematic backups of the files on the laptop. But what about users who do not have a desktop computer? Even if they wanted to back up their portable system, it was very cumbersome—they needed a large stack of floppies and a great deal of time. Along with the increased size of portable hard disks has been the increasing discomfort associated with backing up onto floppies. While, increasingly, tape backup systems were being built into desktop computers, this is a virtual impossibility on portables.



Relief is here. For some time, I have seen announcements of portable tape backups, but I shied away from them. Recently, Colorado Memory Systems, a major player in the backup market, introduced its Trakker line of portable backups. The Trakker comes in both 120MB ($348) and 250MB ($548) configurations. Both units look the same. I used the 250MB model. Although the list prices are high, the drives offer a lot. They come with DOS software as well as an abbreviated Windows package. The Windows version does not allow you to do automatic scheduling of backups; the DOS version lets you do everything. Colorado Backup for Windows ($59), an accessory package, allows you to run the entire package from Windows, including automatic scheduling. Connecting through the parallel port, these systems work perfectly on portable computers. When you use the parallel port for the tape drive, you can still use your printer, plugging it into the back of the tape drive. You cannot print while you are either backing up or restoring—an unlikely need in any case.

A portable tape backup system offers many advantages over built-in systems. First, you can use the system on more than one computer. Simply install the software on all of your systems and then move the Trakker from machine to machine. Second, whether traveling or in your primary work location, this system works to perfection. Also, if you use both a portable and a desktop system, you might consider purchasing the Trakker because of its versatility.

The Trakker measures 4.6" x 2.65" x 9.5" and weighs only 5lbs. It requires plug-in power, but there is really no need to be backing up on the airplane. If you are going to be doing a lot of traveling with the unit, a carrying case ($49) is available to hold the tape drive, its power supply, the cable to connect to the parallel port, and several backup tapes.

The included software is a joy to use. You can do either full, partial, or modified backups. Modified backups make copies of only those files that have changed since the last backup. It is easy to direct the software to back up individual files, subdirectories, whole directories, or just about any kind of selective backup you can imagine. Likewise, restoration is equally simple. You can just as easily restore a whole disk as a single file. Colorado Memory Systems has improved the software interface considerably since its early versions. It is simple, yet powerful, and pretty obvious even without reading the manual.

The 120MB drive uses standard QIC-40 tape while the larger drive takes QIC-80 tape. Transfer speeds depend upon a number of variables including the speed of your computer, the amount of RAM, and the presence of extended or expanded memory. Transfer speeds for the Trakker 120 may reach as high as 4.5MB/minute. The 250 achieves speeds as high as 8MB/minute. It is unlikely, however, that such high speeds will be realized in most configurations.

Colorado Memory offers a full one-year warranty on these units and provides detailed documentation as well as simple instructions for getting started immediately. I highly recommend the Trakker to anyone who is not currently backing up their hard drive. Except for price, I can see no reason to buy an internal tape backup these days. The Trakker compromises nothing, even if you never move this system from a single location.

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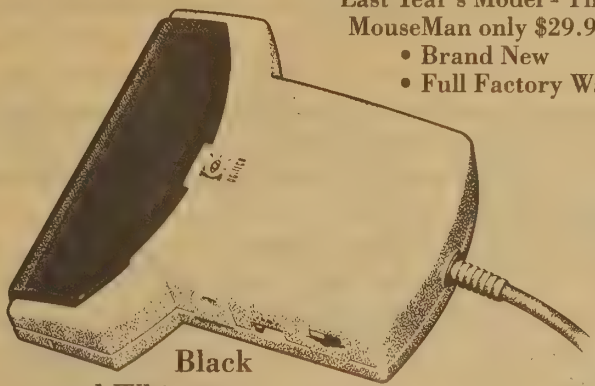

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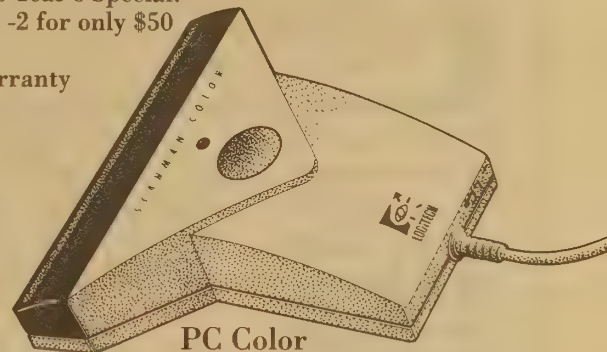
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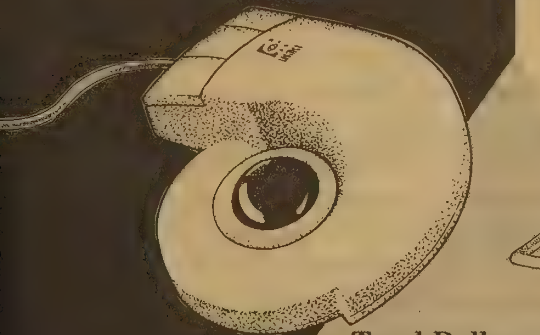

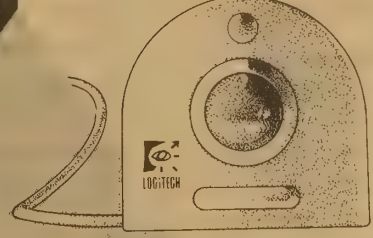

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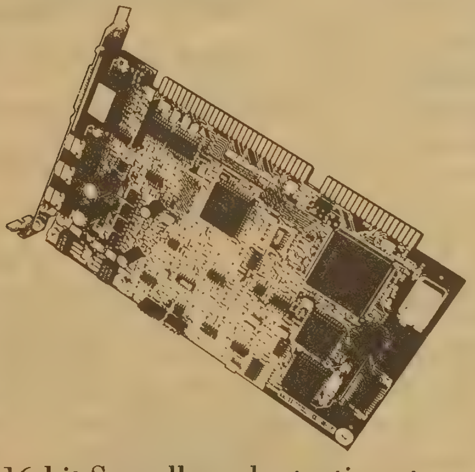

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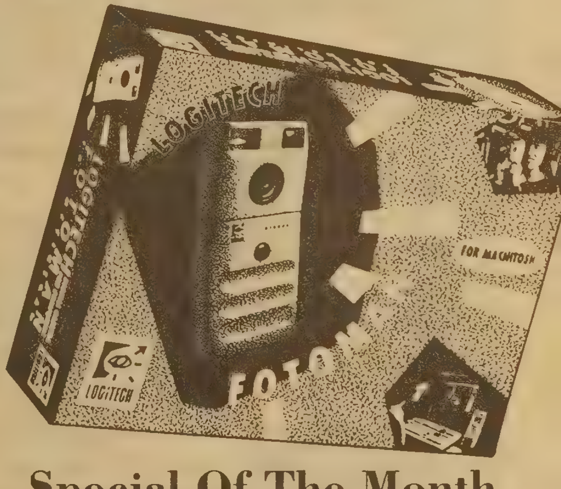
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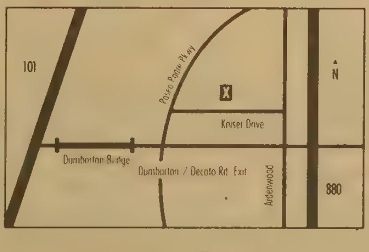
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LAPTOPS

COMPUTER OF THE MONTH:

Gateway 2000 ColorBook

Color portables have arrived! Yes, I know that is old news, but what I mean is that color portables have now descended in price and ascended in quality and design to the point that they are worthwhile and practical for the rest of us, not just the power guys with big bucks. Gateway 2000 sells its entry-level notebook computer for $1995.

RESOURCES:

Gateway 2000
ColorBook, $1995
Gateway 2000, Inc.
610 Gateway Dr.
N. Sioux City, SD
57049
1-800-846-2000

The Gateway 2000 ColorBook 486SX-25 has everything you will need for smooth color operation within a Windows environment. The machine is powered by a 486 chip running at 25MHz. It comes with 4MB of RAM, expandable to either 8MB or 20MB. Memory prices seem to vary like pork bellies, so you have to get a quote from the Gateway 2000 people at the time you want to add memory.

The standard system comes with an 80MB hard drive as well as a high-density floppy drive. The hard drive is removable, so if you need a larger drive it is as simple as unplugging the smaller drive and replacing it with a larger one from Gateway 2000. This computer is also available in more powerful models with larger hard drives and faster processors for prices going as high as $2795. The larger hard drive options are 170MB and 260MB.

The computer measures 11.7" x 8.5" x 1.77" and weighs 5.7lbs. with the battery installed. It has all of the usual, necessary ports on the back and also includes two PCMCIA Type II slots that will hold a fax/modem ($319 for a 14,400bps model or $199 for a 2400/9600bps model) or network cards ($189). These slots are designed so that the two spaces will accommodate a single Type III card as an alternative. Overall, this laptop features sophisticated design.

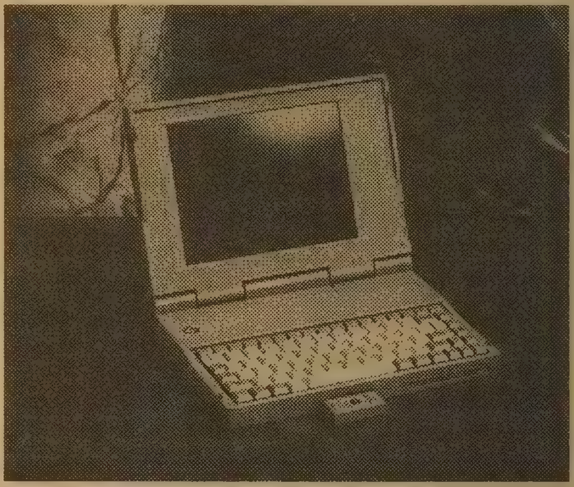
There are a number of features that make this computer special. The display is a passive matrix color LCD, which offers excellent quality. Not too long ago, I would not have recommended that anyone purchase a passive matrix display, but in the last year this has changed. Now, most users will be pleased by the quality these inexpensive displays offer. It is the breakthrough in passive matrix technology that makes color portables affordable. The display on this system measures 9.4" diagonally and has VGA resolution. If you use an external monitor, you can get Super VGA resolution. A sophisticated setup program lets you choose between viewing only the LCD screen, only an external monitor, or both.

The keyboard has an excellent layout and a good feel. You also have the option of using an external, standard PS/2 keyboard. This computer is designed to work with Windows and offers a built-in trackball that pulls out from the front edge of the computer, positioned just in front of the keyboard. I found the trackball to be usable but not optimal—larger balls make for better control. Certainly, however, this device works fine on the go. If you like, you can attach a PS/2 mouse through the port on the back. If, like me, you would want to use both an external keyboard and a conventional rodent, then you could buy Gateway 2000's Anykey keyboard as a $60 upgrade and attach a serial mouse through the serial port.

This laptop is one of the first I have seen that is truly set up for the user who will not be using it primarily as an on-the-go system.

Gateway 2000 has gone to great lengths to build versatility into this computer. A wonderful setup program lets you make many choices about how you want to configure the system. Power management is accessed as either a part of this program or separately. I like the power management module in this unit better than what I have found in other portables. Specifically, I like that you can choose to conserve power when using the built-in nickel metal hydride rechargeable battery pack or to skip the powerdowns when using the included AC adapter. This really makes the machine feel like a desktop unit. While I appreciate having hard disks and displays go to sleep after a few minutes of inactivity when I am running on battery power, when connected to a power supply, I find it annoying to have to wait for the hard disk to come up to speed before I can save or retrieve information. When you do use the battery, you can expect between two and four hours of use before you need to recharge. Recharges take two hours, but only happen when the computer is off or in standby mode. Extra battery packs ($89) are available.

This laptop is one of the first I have seen that is truly set up for the user who will not be using it primarily as an on-the-go system. That, I suspect, is most of us—typically using the machine most of the time at a desk and occasionally on the road. In any case, you can set up this machine to accommodate either use. For instance, if you attach an external monitor and keyboard, you can set up the machine so it will not turn off the computer when you close the lid. Normally, when you close the lid, the computer goes into suspend mode. This is a great convenience when you want it.


Gateway 2000

These units come with MS-DOS 6.0, Windows 3.1, and a bunch of utilities preinstalled. They also come with an uninstalled copy of Microsoft Works for Windows, the best integrated software package for the beginner. Works includes a word processor, database, spreadsheet, and a generous collection of useful utilities including address book, amortization schedules, and others too numerous to name.

If you have decided to take the plunge and go for color, check out the Gateway 2000 machines. They carry a one-year warranty. For an extra $100, you can buy an add-on warranty that guarantees that you will be shipped a replacement notebook within 24 hours if you have a breakdown during the warranty period. While I am leery of mail order units, I have no hesitancy about buying a computer from these folks, as they have done everything to make mail order a safe and sensible option. Their telephone line often puts you on hold, but they give you an 800 number so it is your time, but not your money. They sell all of their machines with a 30-day money-back guarantee. ■

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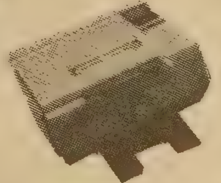

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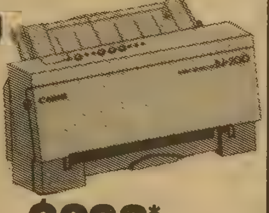

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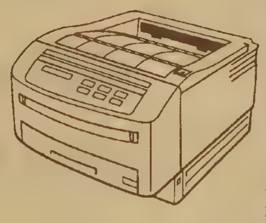

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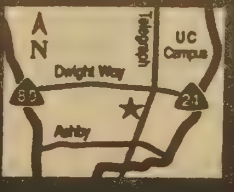

Technical Issues In Telecommuting

A Look At Some Of The Common Concerns And What To Do About Them

BY ROBERT MOSKOWITZ

While this column is not primarily about the technology of telecommuting (in fact, all one really needs to telecommute is a telephone, and perhaps a pencil and some paper), there are some important technological issues that frequently come up in discussions of telecommuting. Here's a list of some of the most common technological concerns and tips on what to do about them:

Computer Compatibility: A computer is not necessary for telecommuting, but if a computer would help you be more productive in the office, generally it would also help you be more productive while telecommuting. This immediately raises the issue of compatibility between the computer one uses while telecommuting and the office computers people use when not telecommuting.

In general, it's a good idea for both the telecommuting and office computers to run the same software. This prevents any problem with data incompatibility, and also lessens the need for a telecommuter to remember several sets of computer commands and procedures. If a person's telecommuting and office computers are already in place, and are not compatible, he or she probably won't be able to use the exact same software and may lose formatting details in their data files. But they can still convert data files from one computer to the other. One approach to data conversion is to add hardware or software that allows one computer to read and write disks in the format of the other computer. Another approach—often more reliable—is to send and receive data from one computer to another over telephone lines. Each computer can read and write the same standard signals on the telephone wire. And each automatically converts between its own special codes and the standard for electronic communications.

The main drawback to incompatible computers is that the difficulty of converting data from one to the other quickly becomes tedious and burdensome. The frequent need for data conversion tends to reduce—rather than enhance—productivity. In practice, therefore, most telecommuters eventually find a way to work on compatible computers both in the office and while telecommuting.

Connectivity Issues: Keeping telecommuters in touch with the home office is far easier if everyone can send and receive computerized messages. The company's own computer network may be extended to the telecommuter's site through dial-up access. Or the company can decide to use commercial computer networks as the main conduit for electronic mail and other data interchanges.

Other improvements due to telecommuting included greater happiness, more energy, higher job satisfaction, extra calmness, improved self-confidence, better focus on work, and deeper involvement in work.

At one time, it was important for everyone intending to send and receive messages to be connected to the same electronic network. But more and more electronic communications systems are adding "gateways" that allow messages to pass directly to and from other—previously separate—computerized messaging systems. For example, a telecommuter on MCI MAIL can easily send a message to a user on The Well, while a user on America Online, or these other systems, can pass information to someone who is connected only through the Internet.

Telecommuters need very little technical know-how to make these connections. Most of the complexity can be programmed into the communications software just once, and any remaining details—most frequently the address of the person to whom one is sending a message—can be kept in a handy telephone directory alongside the person's mailing address and telephone number. To send information, the telecommuter starts a message, adds the address of the recipient (or a list of recipients), and either types the message or sends into the system the previously prepared file. Within seconds, the message is available to be received, or in some cases delivery can be completed by regular mail or by fax.

The cost of using any online service—including your company's own system—includes three main categories: cost per hour of use, cost of necessary software, and cost of local access. Some (like MCI MAIL) charge an annual fee with no per-hour costs, but then charge for each message sent. Others (like America Online) charge a monthly minimum that includes several hours of usage with additional per hour rate, but let users send their messages for free. When evaluating which system to use in (and out of) your office,

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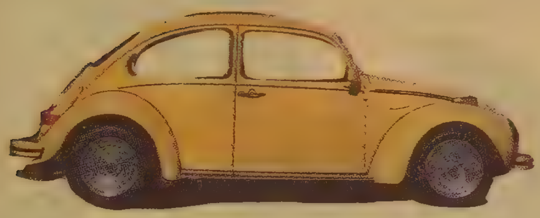

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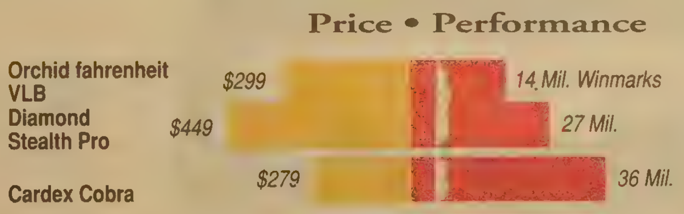

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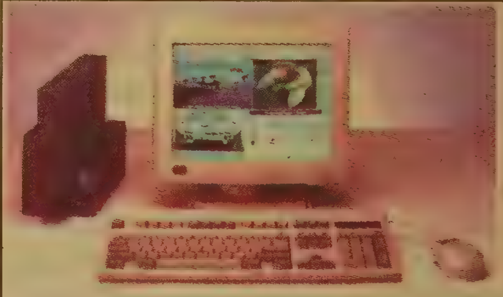

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calculate the total cost of sending typical messages or conducting typical real-time conferences in all three of these categories.

Data Security: Data security may be a small problem or a great one, depending on the employer, the job, and the sensitivity of the data involved. The first question is who owns the data. Most likely, the data belongs to the telecommuter's employer, just as it would if that data were created or used in the regular office setting. A provision of the company's telecommuting policy or the individual's telecommuting agreement should be written to cover these important points.

The telecommuter should be aware of his or her responsibility to protect all data (computerized, and other) not only against theft, but against accidental damage or erasure. This means restricting access to the data, keeping data under control (perhaps even under lock and key), and making frequent backup copies. One computer technology that makes sense for highly sensitive data is the removable cartridge disk drive. This design makes it easy for the telecommuter to physically carry the data around from one location to another, and also to leave none of the data behind in computers used only part-time.

The cost and complexity of security measures designed to protect sensitive data should be appropriate to two factors: 1) the perceived threats (which may include theft, destruction, or corruption) and 2) the potential disruption of the telecommuter's (and the employer's) ability to continue doing business after the data is compromised. In general, fairly simple security measures (such as installing a lock and a smoke detector, and utilizing password protection) used conscientiously and intelligently (that is, without leaving the key or the password lying around where they can be found) go a long way toward minimizing the most likely dangers to data.

Computer viruses are a small but real threat to all computer data, and the level of threat increases with the number of channels and sources through which data passes into the computer. Telecommuters should be careful about the data they bring into their computers, paying particular attention to disks lent them by friends and to "bulletin boards" and other online sources of software they can "download." Consistent use of a good anti-virus program, kept current with the latest anti-viral update package, can be very effective against the threat of data corruption or loss from a virus.

If the data is sensitive enough, telecommuters should be cautious even of using a computer network or even a voice telephone to discuss it, particularly a cellular or cordless phone.

Electrical Problems: These fall into three categories: loss of power, spikes and surges, and interference. (Note that these problems are not limited to telecommuter computers, and can also occur with computers used in the office.)

Loss of power: Whenever a computer saves data, it takes a few extra seconds to save a directory listing that enables it to retrieve that file again. If the power goes off while the computer is writing a file, or a file's directory entry, a great deal of data can be scrambled or lost forever. The comput-

Telecommuting: A Survey

This survey form, from the American Telecommuting Association and *MicroTimes*, is intended to collect details on the telecommuting experiences of a broad cross-section of individuals. Your cooperation in answering these questions will help to make the results of this survey more accurate and detailed. Thank you very much for your participation.

You may copy this form and pass it along to anyone you know who is presently telecommuting or interested in telecommuting.

Please fill in one copy of this form and fax it to: (818)224-4343 (24 hours), or mail it to Survey, P.O. Box 6375, Woodland Hills, CA 91365.

Name (Optional): ________________

Business Phone (Optional): ________________

Age: ______ **M/F?** ______

Job Title: ________________

Employer Name: ________________

Addr 1: ________________

Addr 2: ________________

City, State, Zip: ________________

Your Employer's Attitude Toward Telecommuting: (*Circle One*)

1. Strongly Supportive 2. Supportive 3. Indifferent 4. Opposed 5. Strongly Opposed

# Miles You Travel From Your Home To Work: ________________

# Days Per Week You Make This Commute: ________________

Means Of Travel: (*Circle All That Apply*)

1. Carpool 2. Car 3. Bus 4. Train 5. Bicycle 6. Walk 7. Other

# Miles From Home To TeleWork Site (*"0" If You Work At Home*): ______

# Days Per Week You Telecommute: ________________

# Years You Have Been Telecommuting: ________________

Do You Telecommute As Part Of A Formal Telecommuting Program In Your Company, Or Have You Received Only Your Supervisor's Approval For Telecommuting? (*Circle One*)

1. Formal 2. Informal

How Many Others In Your Company Telecommute? ________________

How Many Other Employees In Your Company? (*Total*) ________________

Types Of Work You Do In Office: (*Circle All That Apply*)

1. Administrative 2. Clerical 3. Analytical 4. Creative 5. Managerial 6. Professional 7. Other

Types Of Work You Do While Telecommuting: (*Circle All That Apply*)

1. Administrative 2. Clerical 3. Analytical 4. Creative 5. Managerial 6. Prof'l 7. Other

Do You Need A Computer To Do Your Job?

1. Yes 2. No 3. Some (*Indicate %*)______

Your Primary Personal Benefits Of Telecommuting: (*Circle All That Apply*)

1. Personal Freedom 2. Time With Family 3. Avoid Commute Time 4. Avoid Commute Cost 5. Avoid Office Culture/Interruptions 6. Other

Your Primary Complaints About Telecommuting: (*Circle All That Apply*)

1. Isolation From Office 2. Conflict With Home And Family 3. Lack Of Resources To Accomplish Work 4. Other

What Do You Need As A Telecommuter? (*Circle All That Apply*)

1. Custom Information 2. Reference Materials 3. Telecommuter Conferences 4. Current Events In Telecommuting 5. Training 6. New Telecommuting Technology 7. Contact With Other Telecommuters 8. Discount Phone Services 9. Discount Purchasing Of Office Supplies 10. Discount Shipping 11. A "Jobs Bank" For Telecommuters 12. Discount Subscriptions 13. All Of The Above 14. Other

Your Future Telecommuting Plans:

1. Continue 2. Stop (Why? When?) ________________

____

er's electronics can also be damaged. Telecommuters should be sure their computers are plugged into circuits that are adequate, and not overloaded with other electrical appliances. The best protection against loss of power, however, is an Uninterruptible Power Supply (UPS). This is essentially a battery that provides power to the computer even when the AC current goes off. The more frequently a telecommuter experiences power outages, the more important a UPS becomes to data security and computer protection.

Spikes and surges: A computer's relatively delicate electronics can be fried to death by a sudden increase in the voltage anywhere in the electrical system. Surges that don't kill them instantly can still cause rapid deterioration and premature failure. Surge protectors are designed to limit any spikes and surges that may occur on the AC line, but cheap ones can be overwhelmed by a faster-than-normal or larger-than-normal increase in voltage, such as that caused by a lightning strike or a massive electrical malfunction. If lightning strikes are common in the area, telecommuters may also want to install a surge protector on the telephone line, because high-voltage electricity can get into a computer system that way, too. Even the static electricity generated by walking across a carpet on a dry day can cause computer problems. Reduce this danger by habitually touching the metal case of the computer before touching the keyboard, monitor, or any other part. There are also anti-static floor mats that help eliminate static electricity before it gets to the computer.

Interference: Electricity in any form creates electromagnetic waves that can interfere with the operation of another electrical appliance. Computers are supposed to be well shielded against electrical interference, but aren't always. If a TV interferes with a computer, for example, data can be scrambled or lost. Even a vacuum cleaner motor can wipe data from a computer's disk drive, particularly if plugged into the same circuit as the computer and turned on or off within range of the drive. If you suspect any interference, keep the offending equipment as far from the computer as possible.

RESULTS OF CONTRA COSTA COUNTY TELECOMMUTING STUDY

A while back I mentioned a newly completed eight-month study of telecommuters in Contra Costa County run by the Institute for the Study of Distributed Work and funded by AT&T. The results of this study, *The Social Impact of Telecommuting*, are now available, and here's a brief rundown:

Supervisors who participated in the study reported that they first became open to the telecommuting option for a variety of reasons: to help meet increased demand for results, to eliminate problems from staff reductions, to improve low morale, to combat traffic problems and reduce commute time, and to reduce stress-related illness among employees. After telecommuting was in place, 63% of supervisors reported that telecommuters were more productive, and telecommuters themselves said—on average—they were 21% more productive as a result of their telecommuting. The main reason cited: better concentration on

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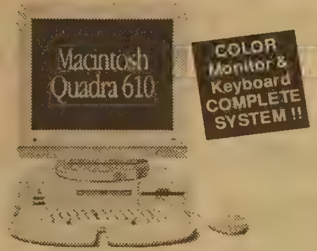

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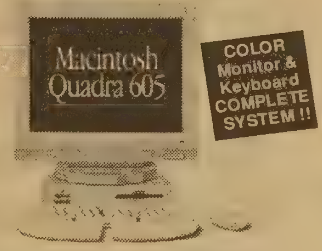

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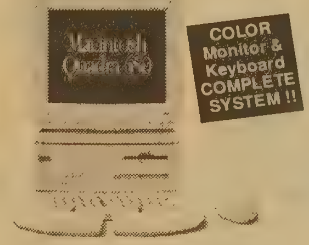

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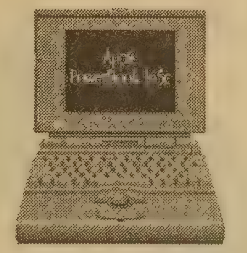

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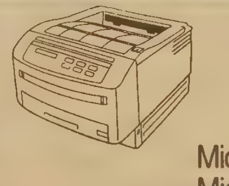

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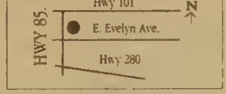

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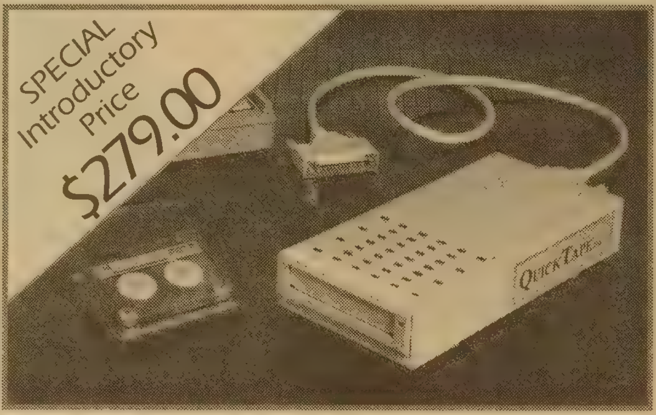

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their work with fewer interruptions. However, other improvements due to telecommuting included greater happiness, more energy, higher job satisfaction, extra calmness, improved self-confidence, better focus on work, and deeper involvement in work.

Some telecommuters said the main advantage of this work style was simply eliminating the commute, while others said they had access to better technology while telecommuting than they had in the home office! Sixty-one percent of the telecommuters reported a significant reduction in work-related stress, and many other noted reductions in anxiety to match. Seventy-three percent said they had more time for family activities, sixty-one percent enjoyed more freedom to make choices in lifestyle activities, and more than half said their "quality of life" was improved through telecommuting.

Keeping telecommuters in touch with the home office is far easier if everyone can send and receive computerized messages.

The study discovered very few negative impacts from telecommuting. The primary problem was not having access to information at the office during the time spent working as a telecommuter. The second biggest problem was (employers: note this carefully) an inability to stop working while telecommuting! There were some transient problems noted, as well, such as difficulties in setting up a telecommuting workspace and some lingering feelings of isolation while telecommuting. There were also minor conflicts when telecommuters tried to keep to a rigid schedule and yet attend necessary meetings at the office.

The telecommuters in this study averaged 3.3 days of work away from the office per month during the six-month study period.

SAN FRANCISCO BAY AREA TELECOMMUTING CENTERS OPEN FOR BUSINESS

The long-awaited Bay Area Telecommuting Development Program has opened the doors of its first two centers, and is actively looking for additional telecommuters who need a good place from which to work.

One center is located at 1333 Willow Pass Road, in Concord, and boasts fourteen cubicles, three private offices, and a conference room large enough for twelve people. There's also a fax and a photocopy machine, a mini-kitchen, and a storage area with lockers for items telecommuters want to leave overnight. The facility is available seven days per week, twenty-four hours per day, although an administrative assistant or "helper" is normally available only during normal business hours.

Typical telecommuters working at the Concord site live in Contra Costa County, and work at the center to avoid a commute into their employer's main office in or near San Francisco.

A second center is in San Jose, at 2635 N. First Street, near Highway 101. It has sixteen cubicles and two private offices, as well as a fax, photocopier, and so forth.

Anyone who would rather drive a few miles to one of these regional centers instead of 50 miles to their employer's office should take a tour and see if the facility nearest them would meet their needs. Funding for the two centers is secure at least through August 1994.

For more information, contact the centers directly, or call Paul Hirsch, project manager, at (510)645-8624. ■

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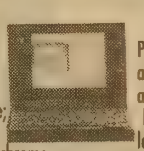

Here's one you can really carry around with ease: the ThinkPad 500, a subnotebook computer. It weighs only 3.8 pounds with battery pack. But it doesn't make sacrifices in power and performance; you'll find 4MB Ram expandable to 12MB. Up to 170MB Hard disk space and a brilliant 7.4" monochrome display. Plus a 486SLC-50/25 MHz processor.

ThinkPad 500
486/25-50MHz, 3.8 pounds
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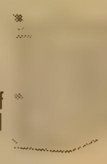

More computer for your money. That's the promise of the PS/ValuePoint family. You get a 33MHz i486DX processor with internal floating-point unit for superior number crunching and dual 8K and 128K memory caches that speed access to instructions. But you also get extra slots (a total of eight) extra bays (a total of six). Speed, value and versatility. Plus a VESA local-bus slot.

MiniTower 486DX-33MHz	**MiniTower 486DX-33MHz**
4MB RAM, 1MB VRAM, 8 Slots, 6 Bays, No Drive	4MB RAM, 1MB VRAM, 8 Slots, 6 Bays, No Drive
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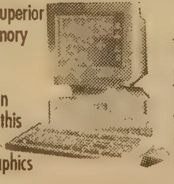
IBM PS/ValuePoint Desktop



Offering speed, versatility and value, the ValuePoint desktop features a super fast 33MHz i486DX processor with internal floating-point unit for superior number crunching and dual 8K and 128K memory caches that speed access to instructions. The ValuePoint is engineered with standard ISA architecture. Your graphics applications will run much faster with the use of local-bus video on this system. Use as a stand alone workstation handling intensive 32-bit OS/2 business or graphics packages, or as a low-cost LAN server.

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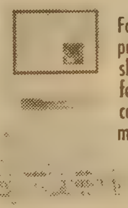
IBM PS/ValuePoint SpaceSaver 433DX/si and 425SX/si



Today's growing businesses and home offices now can save space and get value for their investment. This system is packaged in a three-bay and three-slot chassis to provide expansion. All models come with DOS 6.1 and Microsoft Windows 3.1 software pre-installed.

Space Saver
486SX-33MHz, 4MB RAM,
Basic Keybd **$1125**

IBM PS/ValuePoint SpaceSaver

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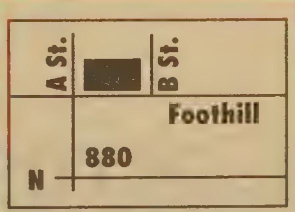

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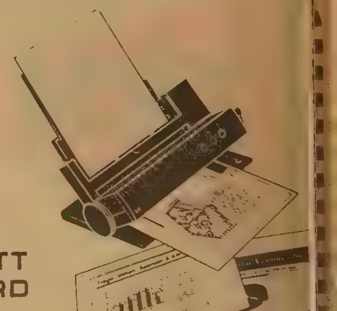

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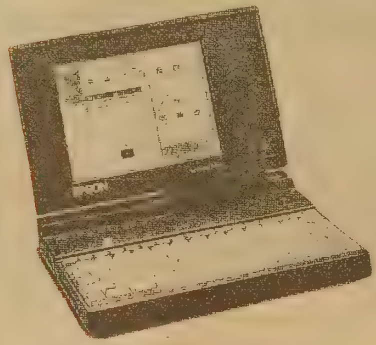

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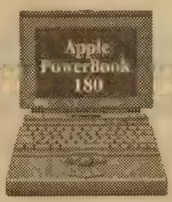

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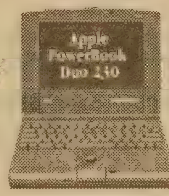

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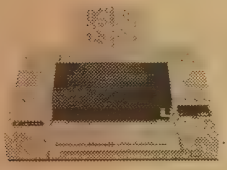

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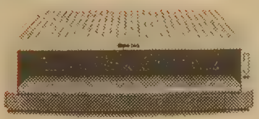

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Contract Techies

Tax Implications Of Alternative Hiring Relationships

BY DAVID A. SIMON, CPA and JENNIFER ROBIN CHERNISS

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Internal Revenue Code Sections 414 & 269A

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If you are a programmer, engineer, or technical writer seeking work on a contract basis, or a firm seeking the skills of such technical workers, you're probably familiar with employee leasing companies, variously referred to as temp agencies, job shops, or body shops. Employee leasing companies serve to match technical workers with employers, and in so doing offer to save both parties time and energy, and navigate through a complex web of tax and other legal considerations.

Many users of job shops, both service recipients and professionals, fail to fully understand the tax ramifications of these arrangements. I hear programmers, in particular, express frustration that body shops offer low rates and that, due to a poor understanding of the law, many employers hire only through such shops. Armed with a little background, the savvy contract worker may negotiate a more lucrative—and safer—deal.

> *Armed with a little background, the savvy contract worker may negotiate a more lucrative—and safer—deal.*

In a typical employee leasing arrangement, a computer programmer, for example, is regarded as the employee of the job shop for tax purposes. The job shop, rather than the worker or service recipient, is responsible for income tax withholding and employment taxes. Some offer additional benefits as well. If the programmer is an independent contractor and the agent merely a matchmaker, however, the programmer is responsible for paying his or her own employment taxes, and for making estimated tax payments (the role of brokers working strictly as matchmakers, taking a fee from either or both parties to match a contract worker to a company, has little tax consequence and is not covered here).

WATCH FOR RETIREMENT BENEFITS

In addition to payrollphobia, employers sometimes use job shops to avoid the complicated restrictions placed on employee coverage by qualified retirement plans. There are, however, important Internal Revenue Code restrictions and limitations applying to employers who use leasing companies for this purpose. Both employers and technical workers should have some familiarity with these rules before negotiations begin.

First, a little history. At one time, employers could circumvent nondiscrimination rules applying to employee retirement plans and welfare benefit plans by setting up a separate corporation providing few, if any, benefits. The carefree employer would then lease the employees from the separate corporation, *sans benies.* In 1982, this practice was restricted. A provision of the Tax Act passed that year (Section 414(n)) specifically deals with body shops.

If requirements defined in this Section are met, the programmer is treated as the employee of the service recipient rather than of the body shop for purposes of employee benefit coverage. This rule is quite broad, incorporating nondiscrimination rules that apply to a wide range of retirement and employee welfare benefit plans described in seventeen separate Code sections.

To fall within the Section 414(n) definition of a leased employee, the worker must be supplied to a user by the body shop on a substantially full-time basis for at least one year. Additionally, the services provided by that worker must be "of a type historically performed, in the business field of the recipient, by employees."

Consider Patience D'Bayze, who develops database applications. A job shop offering no employee benefits hires D'Bayze and leases her to a mid-size manufacturing company on a substantially full-time basis for over a year. The company lacks an in-house programming staff, consistent with industry practice. Section 414(n) would probably be interpreted to mean that the services D'Bayze performs are not historically performed by employees; therefore, the leased employee rules do not apply and D'Bayze, as an employee of the body shop, receives no retirement contributions.

The opposite conclusion would likely result if D'Bayze does the programming for an insurance company that historically performs extensive claims analysis. Here, Section 414(n) would apply and the insurance company would have to provide the benefits to D'Bayze.

A loophole relieves the service recipient from treating leased employees as their own for pension purposes if the job shop maintains an adequate plan of its own. This "safe harbor" limits the number of leased

Copyright © 1994 by David Simon. All rights reserved. *David A. Simon, CPA (M.S., Taxation) is in tax and accounting practice in Oakland and writes on a variety of business issues. His clients include professionals and businesses throughout the state. He can be reached at (510)893-5753. Jennifer R. Cherniss, a free-lance writer based in Berkeley, specializes in making boring technical information seem less so. Her services can be obtained at (510)893-5753.*

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employees who may qualify for the pension plan.

Technical workers about to negotiate compensation with a job shop should consider the hiring party's motives. At an early stage in the negotiation, determine as much as you can about what the service recipient does. You may wish to avoid tipping your hat, however, that you're trying to determine if the services you perform are of a type historically performed, in the business field of the recipient, by employees. Also, get a feel as to how likely it is that your services will be sought, on a substantially full-time basis, for at least one year. If you believe that the body shop is being used as a vehicle to circumvent benefit coverage requirements, you may be in a position to command a premium for your services.

If you represent the body shop, on the other hand, it would be to your benefit—if applicable—to point out that the assignment has not historically been performed by employees. If you're certain that the service recipient doesn't plan to use the worker for more than one year, make this clear up front also, so that the professional can have some perspective on the relative strength of his or her bargaining position.

DANGEROUS DEMANDS

Independent programmers sometimes incorporate and offer their incorporated selves through an agent or broker, often because some job shops prefer it that way or even demand it. In some cases, body shops have tried to strengthen their position with would-be employers by conveying the impression that the employer would be vulnerable to all sorts of liabilities should the contracted employee attempt to change his stripes before the eyes of the IRS.

> ***Technical workers about to negotiate compensation with a job shop should consider the hiring party's motives.***

With the worker incorporating, the body shop hopes to pass the onus of employment taxes back to the worker, and to avoid benefit coverage requirements; the technical professional seeks to attain various corporate tax advantages. This path is a minefield. I would be wary if parties insist on such a relationship.

As detailed in my September *MicroTimes* article, discussing whether or not it's advisable for programmers and software developers to incorporate (for a reprint, please call my office at 510/893-5753), even professional tax planners need to be careful when evaluating the consequences of incorporating professionals such as engineers, programmers, or technical consultants. At least eleven sections of the Internal Revenue Code impose restrictions related to personal service corporations.

One of these, Section 269A, is used by the IRS to attack service providers incorporating for tax-motivated reasons. It allows the T-men to reallocate income, deductions, credits, etc., directly to the employee-owner—in essence, disregarding the corporation's existence. Briefly, Section 269A may be triggered if a) substantially all of the services of a personal service corporation are performed for (on

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behalf of) a single other entity, and b) the principal purpose of being incorporated is tax motivated.

A personal service corporation is defined, for purposes of this law, as "a corporation the principal activity of which is the performance of personal services and such services are substantially performed by employee-owners."

Suppose Poindexter Dangerfield, a computer programmer, had, at the request of his body shop, incorporated and made himself an employee of his own corporation, which then contracted with the body shop. Dangerfield later finds that the corporation is not respected for tax purposes because both of the above conditions were found to be true (the agency was his only "client").

What's more, under the terms of their agreement, the body shop handling Dangerfield maintained control over the work he performed and how he performed it (for a discussion of the IRS twenty-factor test of employee "control," see November's article on independent contracting, which can also be obtained from my office). Regardless of any agreement to the contrary, the IRS considers Dangerfield a common law employee of the body shop. Now things really start to suck.

First, Dangerfield finds that many of the deductions on which he had counted are unavailable. All his home office deductions are disallowed because no home office was required as a condition of employment. Similarly, deductions claimed for the cost of Dangerfield's home-office computer equipment are disallowed, under a combination of restrictions applying to computer equipment and employee business expenses. Deductions for advertising, supplies, and mileage expenses were all obliterated because they amounted to less than 2% of his adjusted gross income.

Instead, Dangerfield owes back taxes, interest, and penalties.

At least he can rest assured that the body shop doesn't escape with impunity. Tax liabilities faced by an employer for misclassifying an employee are as follows:

1. Income taxes that the employer failed to withhold.
2. FUTA taxes that the employer failed to pay.
3. Both the employer's and the employee's share of FICA taxes.
4. Penalties for failure to make timely tax deposits.
5. Penalties for failure to file information returns, or correct information returns.
6. Accuracy-related penalties relating to substantial understatement of income tax (if no adequate disclosure was made).
7. A 100% penalty if the failure to collect and pay over taxes is willful.
8. A penalty for aiding and abetting the understatement of tax liability.
9. Remedies for failure to comply with state and local tax and worker's compensation requirements.

Employee leasing is carefully regulated by tax laws, but not everyone hanging out a shingle as an employee leasing company necessarily knows or follows the law. Service recipients, as well as contract or temporary employees, should carefully check out a prospective job shop. If you are considering using a body shop, here are some questions (primarily for service recipients) to ask:

1. Does the job shop provide retirement plan benefits to the leased employee? If so, will they provide the service recipient with an enrolled actuary's opinion letter stating that the plan is adequate? Do they provide

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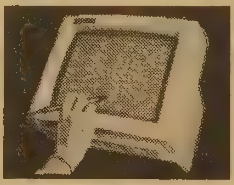

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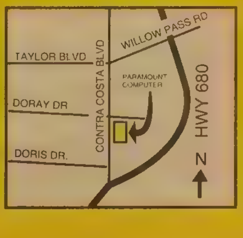

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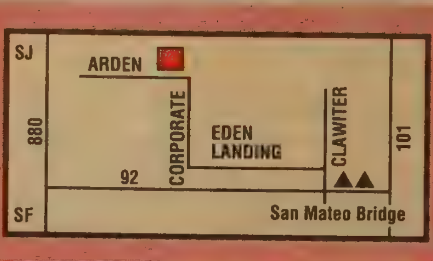

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The Tale Of The Two Margarets

Or

Smarter UNIX Mail With MIME

BY BENNETT FALK

UNIX

"I was dialed into a UNIX system, trying to send email. While I was typing the message the whole system suddenly just froze. I couldn't do anything! I pressed every key I could think of, but nothing worked. None of the characters I typed showed up on the screen. Whenever I pressed a key, my terminal just beeped. Convinced that I had either crashed the system, or broken my modem, I finally just turned the modem off."

When, over a three-week time period, two very intelligent people named Margaret independently reported this problem (using almost identical language), it was evident that something was up. If your name is Margaret, or if you know someone named Margaret, the next couple of paragraphs may save you some grief.

> **UNIX mail** is *not* a word processor: it contains virtually **no editing features** other than the ability to **backspace** over characters within a line.

The mail programs that come with UNIX are notoriously terse. When you give a command like *mail rosebody@well.com* the mail program will put whatever you type next into the body of the message. There is no prompt that tells you that what you're doing is entering the text of your message. Some mailers will prompt for a subject, but after that, you'll drop into the formless void of message entry.

Upon encountering this formless void many people assume it is something like a word processor, and this is the heart of the problem. UNIX mail is *not* a word processor: it contains virtually no editing features other than the ability to backspace over characters within a line. Consequently, it doesn't automatically break lines for you. If you don't do something (like press RETURN) to break lines in your message, everything you type will be on one line. Eventually that line will be as wide as your screen, and if you keep typing without pressing RETURN, the very long line will simply get longer. (Appearances can be deceptive here: a line that is wider than your screen will be folded at the edge of the screen and continued on the next line of the display. The mailer program is blissfully ignorant about the size of your screen, it judges line breaks exclusively by the presence of an end-of-line character that is inserted into your message only when you press RETURN.)

None of this would amount to a hill of beans if it weren't for the fact that UNIX mailers typically can't tolerate lines longer than 256 characters. When you attempt to enter the 257th character on a line, the mailer will simply beep at you. And this is exactly what happened to the two Margarets.

(Actually, there are two things that can be done when you've typed a 256-character line in a mail message: abort the message by typing control-C or backspace over characters to shorten the line.)

MAIL AND ITS LIMITS

The 256-character line length limit is the kind of thing that drives some people nuts. Increasing the limit would reduce the frequency with which people encounter it, perhaps shifting the burden from Margarets to Algernons. However, the new limit would be no less arbitrary than the old one. The real problem is not line length, but that the sender of a mail message has to be concerned with lines at all.

There are good reasons for the mail program to be conscious of lines and their lengths: electronic mail is a "store and forward" service: the mail you send is likely to be routed through several computers on its way to the recipient. You can't control the routing and you don't know what the capabilities of the intervening machines are. The safe thing is to send messages in a format that virtually any mail-sending daemon can handle: 7-bit ASCII with relatively short lines and relatively short messages.

The use of 7-bit ASCII text is not just a quirk of the UNIX world. It was adopted long ago as the standard for mail messages on the Internet. It's worth knowing that the document specifying the format of mail messages that can be safely transferred through the Internet is Request For Comment 822 (RFC 822). The RFC 822 format specifies 7-bit ASCII and a maximum line length of one thousand characters.

Much of the data that people want to share via email does not occur naturally in RFC 822 format. Consequently, a number of utilities have been developed to get data into and out of formats that can be transferred safely through email. Uuencode/uudecode are widely used by UNIX and PC users; BinHex is widely used by Macintosh users. These utilities generally work very well. However, they aren't well integrated with the programs people use to send and receive mail. Coding and decoding files for email is usually done manually, and this requires both time and know-how. Imagine how much less USENET traffic there would be if no one needed to ask or answer questions about uudecode.

ENTER A MIME

The problem of making electronic mail

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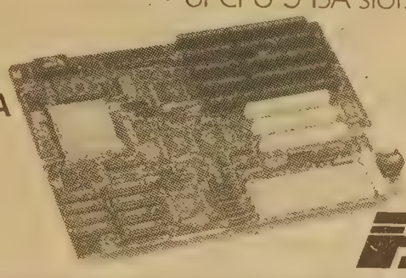

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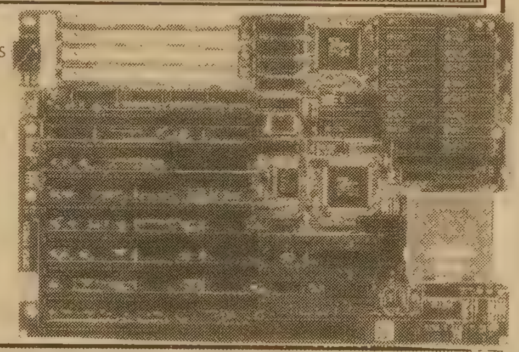

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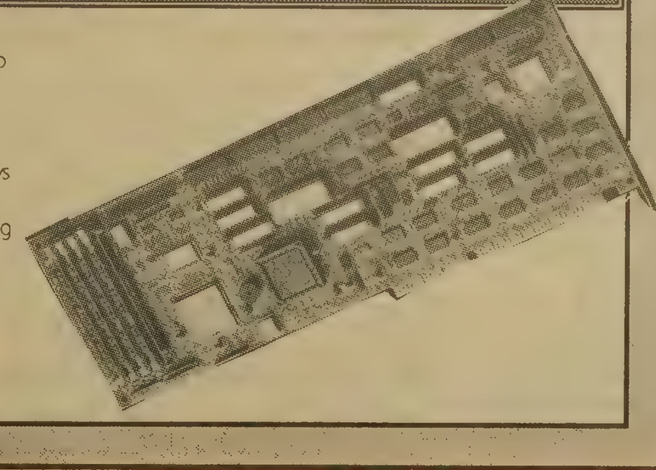

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more versatile (at least for Internet users) is addressed by the Multipurpose Internet Mail Extensions (MIME). MIME is not a piece of software. It's a standard for assembling, encoding, and decoding complex messages for transfer through email on the Internet. The evolution of MIME can be traced through a number of Internet RFCs, but RFC 1521 is the definitive document.

The importance of having a standard for this is that mail programs written according to the standard can free the user from having to compose messages exclusively in RFC 822 format. The MIME standard provides a way of including many different data formats (binary word processor formats, graphics, sound, non-ASCII character sets, or application-specific data) in mail messages. Of course, the transfer of mail messages still happens in a 7-bit ASCII format, but MIME provides an interface that mail programs can use to shelter the user from the business of converting data into and out of 7-bit ASCII. The literature about MIME refers to the programs used to compose and send mail as "user agents" or "mail user agents" (MUA).

> Electronic mail is a **"store and forward"** service: the mail you send is likely to be **routed** through several computers on its way to the recipient.
> You can't **control** the routing and you don't know what the **capabilities** of the **intervening machines** are.

Note that MIME is not a standard for playing sounds or displaying graphics. MIME makes possible easy delivery of almost any kind of data via email, but using that data once you've received it will almost certainly require some additional capabilities that aren't part of MIME at all. For example, if you receive email containing graphics in GIF format, you'll need a GIF viewer to display them. Of course, there is a lot of incentive for people building MIME-compliant mail programs to bundle in other features (like image viewing or, shudder, word processing).

MIME works by providing three things: a set of categories for classifying the contents of mail messages; standard means of encoding data to be transferred through mail protocols that require 7-bit ASCII messages; and a mechanism for packaging the classification and information in the message header, and sending this information with the message to allow the mail program that receives the message to respond to it in a sensible way.

Under the MIME standard, the body of a mail message is assigned a type and a subtype that describe the message's contents. MIME defines seven content-types (text, multipart, message, application, image, audio, and video), and there are canonical subtypes for each type. (Image, for example, has subtypes that specify jpeg and GIF formats.)

The seven content-types are supposed to be all anyone will ever need to classify mail message contents, but the types are also indefinitely extensible. Any type beginning with "x-" is assumed to be user defined.

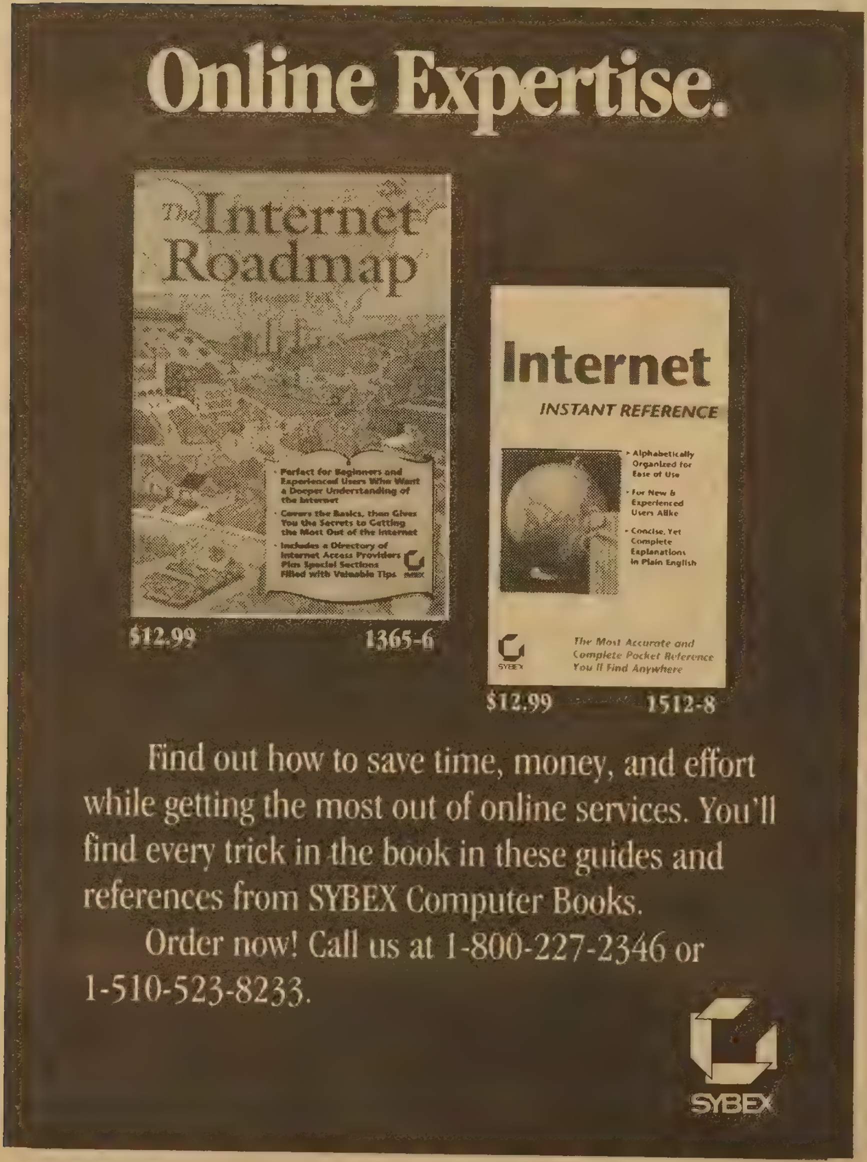
The MIME standard supports two strategies for encoding these message types for transfer via electronic mail. Both these strategies produce messages in an RFC 822 compatible format. The BASE64 scheme is more appropriate for binary data, while the QUOTED-PRINTABLE scheme works well for messages that are mostly text with some unprintable characters.

Finally, MIME provides for the content-type and transfer encoding information to be recorded in the mail message header. Bundling this information into the message header gives the mailer enough information to decode incoming messages and invoke the appropriate application for the data received.

The MIME standard has sparked a great deal of activity in the already burgeoning field of alternative mail programs. There are MIME-aware versions of established mailers (elm and MH, for example), as well as relatively new products like Eudora by Qualcomm.

User reports and MIME-compliant product development news can be found in the USENET newsgroup comp.mail.mime. A compilation of frequently asked questions in comp.mail.mime is published as the mime-faq in netnews.answers. For details on the standard itself, see RFC 1521, available by FTP from many Internet sites.

Someday soon, Margarets and others will be able to compose a mail message of any length without having to press RETURN. ■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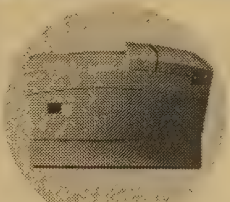

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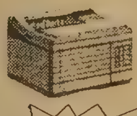

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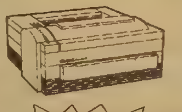

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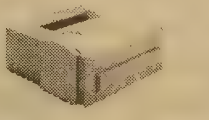

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LANS

My first recollections of local networks hails back to some articles I read in the early '70s. Their authors envisioned networks that allowed work to be processed on multiple processors coupled by a bus.

There are parallel-processing systems like these today. However, while local networks may have first been proposed as cooperative processing systems, what drove them to the mainstream was the ability to share resources. Saving the cost of expensive printers and hard disks was the key.

Today, the costs of storage are falling so fast they nearly threaten to overwhelm the increasing needs of new generations of software and applications. (Of course, even if that should happen, even if storage costs for things like full-motion video became nominal, we would still want to have a central repository of universal data.)

Printers too are falling in price, and high resolutions and color are becoming quite affordable for even small networks. The use of color is not yet widespread, though, and probably won't be at least until color duplication costs fall.

As to monochrome printing, the inexpensive 600-dot-per-inch (dpi) printer is now the benchmark of print quality. Yet, there are printers with still higher resolutions that produce far superior graphics. In some cases, this quality nearly rivals professional print shops, and some output can be too high resolution for an average press to duplicate.

You may think you would never have a call for such high resolution. Consider this though. You're used to seeing 256 shades of gray on your monitor. Yet, 600 x 600 printers may produce only fifty-one shades at 600 dpi, or they may produce as many as ninety-one grays, but only by reducing their resolution to 300 x 300 dpi. Much higher resolution is necessary to produce the additional shades that create photorealistic images.

THE TROUBLE WITH HIGH-RES PRINTERS ON A LAN

Unfortunately, while relatively inexpensive high-resolution printing systems of this type have been around for several years as standalone solutions, they have had a serious drawback for networks. Because they have been based on the print engines used in conventional printers (most often as retrofits to popular Hewlett-Packard printers), these systems require a board in the workstation. The board processes document images which are then sent directly to the printer's video controller. So every workstation connected to such a printer requires many expensive megabytes of dedicated memory for each of these image-processing boards.

Not only the upgrades based on this technology, but complete systems which include a printer, use this model. Consequently, any significant document volume with this type of system threatens a network's throughput. It's a good solution for single users or small service bureaus, but less satisfying for networked users.

A BETTER SOLUTION FROM SAMSUNG

Now there's an alternative that works much better with networks—and does it for less. It's the new Finale 1012 from Samsung, a printer targeted at eight to ten workstations producing typical word processing documents. The Finale has what Samsung calls HighResolution Halftone Technology, allowing it to print 256 shades of gray in each of its dots.

It's basically an enhanced version of Samsung's Finale 8000 with the Image1200 kit (also sold in an integrated unit as the Finale HiRes) to which Samsung has added available interfaces for Ethernet or Token Ring. Like Samsung's model 8000 printers, the 1012 achieves its resolution by electronically imaging a number of dots into each quadrant of the 300 x 300 dots the printer's engine can mechanically address. Even the toner is special, and its dots are too fine to see clearly without magnification. That allows the 1012 to offers 72-, 83-, 106-, & 150-line-per-inch screens with an effective resolution up to nearly 2000-dots-per- inch. It's incredibly detailed output has near photographic quality.

In fact, unless you're going to print its output on a very expensive high-end press, you could have difficulty reproducing it at the highest resolution. Just ask an imaging expert like John Pratt, marketing manager at Digital Vision, Inc., the manufacturer of ComputerEyes video-capture products and TelevEyes computer to TV converters. Pratt says that "high-end image setters can print so finely, that they are essentially continuous tones. Offset printers can't print images that fine. The dots moosh together."

Although it does it differently, this printer produces something similar to the output of an image setter. And when normally discounted, the Finale approaches this quality for around $2000, a small fraction of an image setter's price, and far less than even the $9000 you might pay for a printer that requires an imaging board in your workstation.

In addition to its network interface options, the 1012 also supports networking with 10-page-per-minute (ppm) printing, two more ppm than the 8000 models. The unit has added springs under the top cover to give more consistent printouts in its high-resolution mode, and includes new firmware and more powerful, faster paper-feed motors to support its higher production levels too.

Samsung also speeds things by using the latest Intel 4.0 i960 compiler to create

continued on page 75

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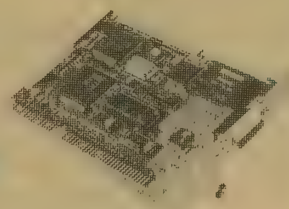

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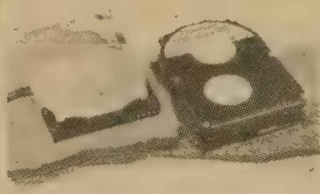

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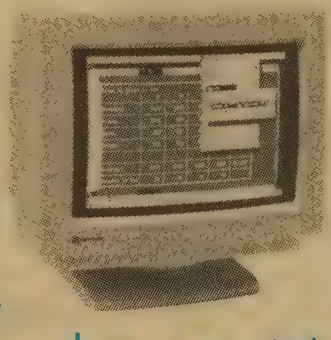

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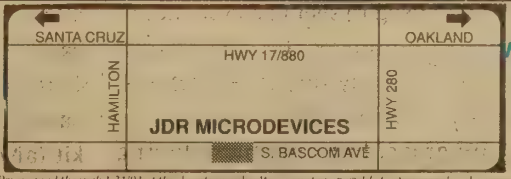

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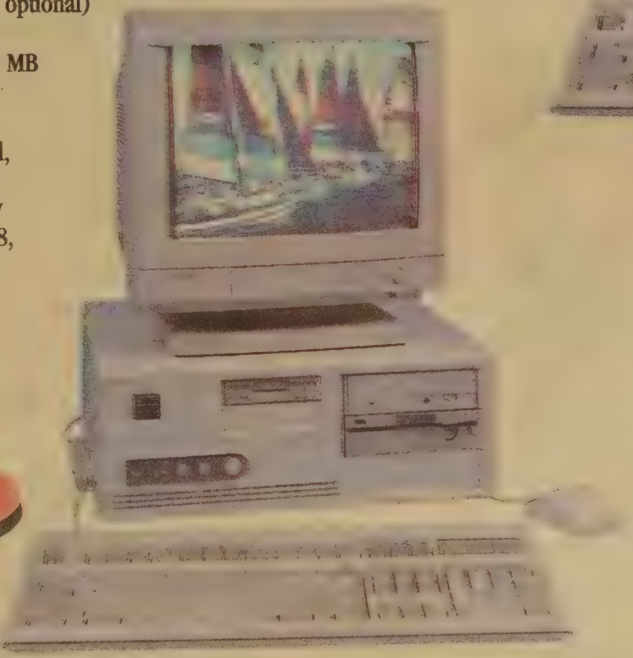

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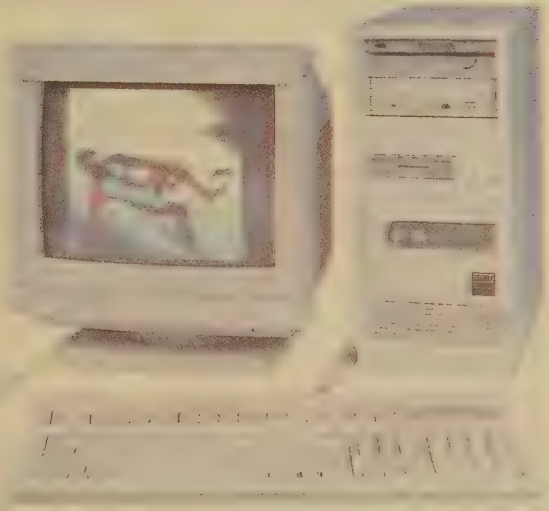

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continued from page 70

firmware that runs the chip faster in this model. The company claims that this pushes the unit's 16MHz i960KA RISC processor to the performance levels of a 20MHz i960KA run with the old compiler code. The combination of its features allows the 1012 to print complex pages at nearly its full-rated engine speed.

Six million words of memory are required for the 1012 image full pages at high resolution, and every byte of it is standard. Moreover, printer memory is expandable to eighteen million bytes for the purpose of holding documents in the printer while their images are processed. That frees the workstations on your web for other duties much more quickly than a printer which accepts data only as fast as it can image it.

Like Samsung's 8000 models, this printer offers a very high level of compatibility for a wide variety of software. Emulations include PostScript Level I, PCL5, and HPGL/2 (which adds the HP 7550 polygon commands for full CAD/CAM support). It also includes IBM Proprinter XL/24 and Epson FX-850 commands. Furthermore, a TrueType rasterizer is included which will print the Windows 3.1 TrueType fonts as TrueType fonts. Without such a rasterizer, Windows automatically converts its fonts to the Type I format. (What this means is that printers without this support are not quite true WYSIWYG.)

The Finale 1012 is a breakthrough for smaller networks, and in the near future, Samsung is moving up to support slightly larger ones. Samsung expects to introduce the Finale 1212, a 12 ppm printer with higher quality output, at Spring (Comdex) next year. The unannounced unit will be based on a 600 x 600 x 4 engine that will produce 2400 x 2400 dpi, and it is expected to have built-in network fax support as well. Samsung has not talked publicly about the 1012 prior to the exclusive interview for this column, so pricing information is not yet available. However, Samsung seems as committed to price leadership as it is to technological leadership. I expect it will be a bargain for small networks

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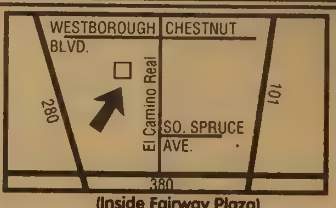

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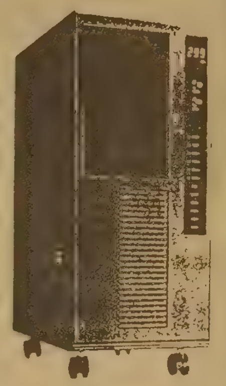

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Toshiba 2 88MB	$58
(w/contl & 2 88 floppy disk).	$94

FLOPTICALS

IOMEGA 21MB w/1 Disk. Cable	$419
YE-DATA 21MB w/5 Disks	$392

2.5" NOTEBOOK DRIVES

QUN 120 /160MB 16msec	$245/419

IDE

CON 80/120MB 19 msec	$151/179
CON 127MB 17 msec	$179
MXT130 18msec	$179
ST 130MB 15msec	$180
CON/QUN 170MB 13/17 msec	$208/196
CON 210 14msec	$229
WD 212 12msec	$215
MXTR 213 15msec	215
ST214/260MB	$210/229
QUN 270/MXT 245MB 15ms.	$241/229
CON/WD250MB 14msec	$238/235
WD 340/MXT 340MB 12/14 ms	$279/289
CON 340MB 13msec	$289
ST 341/452MB	$299/435
WD 425MB 13msec.	$339
CON 510MB 12ms.	$379
FUJ 520MB 12 msec 5yr.	$520
MAXTOR 540MB	$599
QUN 525MB Fast	$538
WD 540 12msec	$475
CON/MXT 540MB 12/8msec	$495/660
MICROPOLIS 1/1.8GB 10ms	$1025/1325

SCSI - 3.5"

CON 170MB 17msec.	$205
CON 212MB 12 msec	$280
MXT 245/QUN 240MB Fast	$245/240
MXT 340MB 15 msec	$339
CON 340MB 13msec	$330
ST 535/545MB 10/12msec	$599/569
FUJ 520/QUN 525MB 11 ms	$520/550
MXT 540MB/CON 540 8/12 ms	$599/525
TOSH 877MB/1GB 12 msec.	$559/699
TOSH 1.2GB 12msec	$875
CON 1GB 9msec	$989
MXT 1.2GB 8 msec Magix	$1189
MICROPOLIS 1/1.8GB 10ms	$1025/1325
HP1 2GB 10.5msec.	$1040
ST/FUJ 1.2GB 10 msec	$935
QUN 1.0/1.2GB <10 msec	$920/1036
DEC 1.6GB 9.5 msec	$1160
CON 1.67GB 10.5msec	$1035
ST 2.1GB 9 msec	$1775

SCSI - 5.25"

HP 1.7GB/2.0GB 11.5 msec	$1830/2030
ST 1.7GB 11 msec Elite I	$1715
Fuj 2.4GB 12 msec.	$1479
ST 2:2/2.5GB 13/11 ms EliteII	$1569/1980
ST 3.5GB 11msec	$2212

SUPER HARD DRIVES

Seagate Barracuda 3.5" HH (8 msec ....avg. seek, 4.17 msec lat., 7200 RPM)

Barracuda 1.7/2.5 GB	$1925/2100
EXTERNAL HRD. DRV. SUBSYSTEM FOR EXT. HARD DRIVE	ADD $99

FLASH CARD HARD DRIVE

ST 75A 1 8" 5 2MB IDE<1.5MS	$484
ST 710/720A 1 8" 10.4/20.9MB	$888/1177
ST 740A 1.8" 41.9MB IDE<1.5ms	$2068

TAPE DRIVES

(<500MB TAPE-BACKUPs)

Colorado 120 / 250MB	$99/167
Colorado KE-10 External kit with card	$105
Colorado External port card	$37
FC-10 high perf card	$85
Colorado Trakker 250MB.	$329
Archive 250MB w/QIC,150MB/min,1"H.	$146
Archive Viper 250MB hh SCSI I/E	$335/425

(>500MB for PC / SERVER)

Viper 525MB hh SCSI Int/Ext 6MB/sec	$440/530
Archive 4320 NT 2 0GB DAT 3.5"	$829
Archive 4324NT 4.0GB TURBO DAT 3.5"	$1075
Colorado 2.4 / 4.0 GB Qic 5.25	$929/1499
HP 2GB DAT 4mm Int/Ext	$970/1060
HP 4-8GB DAT 4mm Int/Ext	$1128/1179
WANGDAT 3100 2.0GB 4mm Int/Ext	$885/985
WANGDAT 3200 4-8GB 4mm Int/Ext	$1030/1140
EXABYTE 750MB HH MINI Int/Ext.	$692/860
EXABYTE 8200 5GB HH Int/Ext	$1415/1635
EXABYTE 8505 10GB HH Int/Ext	$2239/2505

(above drives require special contr & soft drivers)

TAPE BACKUP DRIVERS

Novaback for DOS//OS/2	$79
Novanet Multiuser NLM	$439
ARC Serve Solo.	$185
SYTOS for DOS/NOVELL, GEN.	$120
CONNER-EXEC NLM BACKUP SW	$189

ERASABLE(Rewritable)

TEAC 128MB 3.5" Int/Ext	$625/729
PinnacleTahoe 130 portable 3.5"Opti w/inter.	$956
IBM 127MB 3.5" Int/Ext	$833/943
Hitachi 680MB Int 5 25.	$599
Panasonic LF-7010 1GB 5.25	$2739
HP 1.3GB 5.25" SCSI-2 EXT	$2799
MAXOPTIC 1GB Tahiti IIM 35msec	$2300

REMOVABLE DRIVES

Syquest 44MB Dr	$249
.... W/Ext Case, Cables, Cart, Cont.	$379
Syquest 88/105MB Dr	$308/469
Bernoulli 44/99 Insider	$907/840
IDE: Upto 1GB removable kits	$39
SCSI: Upto 1GB Removable Kits	$138

STORAGE MEDIA

Floppy 1.44 Bulk	$.69
Floppy 1.2 Bulk	$.49
Tape DC2000XL	$18
Tape DC2120 250MB..Formatted	$18.5
Tape DC 6250 5.25", 1/4" Cartridge	$27
Tape DC 6525 5 25", 1/4" Cartridge	$31
TK50 for DECs.	$26
DT-2400 2.4GB .25" Cartridge	$54
DT-4000 4.0 GB .25" Cartridge	$57
DAT 4mm 90 mtr HP/OEM	$19/14
DAT 8mm 54/112 mtr	$18/24
Syquest 44/88/105MB Cart	$62/94/85
Bernoulli 44MB/90MB 3Pk	$315/415

OPTICAL CARTRIDGES

Mag neto-Optical 650MB Cartridge	$159
600MB/650MB 5.25"	$109/149
128MB 3.5"	$59
10024 B/S WORM 5.25"	$109

MONITORS

MONO

Mono 12"	$78
Mono 14" amber/white	$89
Mono 9" VGA	$109
Mono 14" SVGA 1024 x 768	$112

VGA/SVGA

VGA IBM 8513 13" .28 refurb 1yr	$160
VGA Arche 14" 31 Refurb 6 mon	$155
Touc VGA 14" 640 x 480, .51	$173
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Orch/Imp/Touc 14" 1024 x 768 .28 Int	$235
Orch/Imp-Hyun 14" 1024x768 28 NI	$248
Black SVGA 1024x 28 I/NI	$279/320
CTX 14", 28 Int. 1024x LowRadiation	$259
CTX 14", 28,NI 1024x w/Hitachi tube	$275
CTX 1561/1560LR, 28,NI	$365/425
CTX 1760DF/1760LR, 28,NI	$685/745
Samsung 15" NI Flat .28dpi 72 Hz	$449
Mitac 17" .31dpi 1024 72Hz NI	$475

CAD MONITORS

Nanao

F340iw 15", 28, 72Hz, MPRII, Mic	($665) $685
F550i 17", FST 26, MPRII	($985)$1015
F550iw 17" FST 1280NI, 28, 75Hz	($1159) $1189
T560i 17", FST 28, MPRII.	($1668) $1729
T660i 20" Trin, 72Hz, MPRII	($2425) $2515
F760iw 21" FST 1280NI, 31.	($2195) $2285

NSA-Hitachi

CM1797 17" FST, .28.1280NI,MPRII	($1189) 1239
CM2095 20" 1280 Anti Glare	($1329) $1376
CM2087 20" 1280 72Hz Mic	($1619) $1689
CM2187-515 21" .28.	($2059) $2139
CM 2188 21" .28	($2419)$2495

Hitachi America

ACCUVUE PS-20	($1585)$1645
ACCUVUE PS-21	($2079) $2155
ACCUVUE PS-21A	($2295)$2389
ACCUVUE PS-21.28,Mic	($2359) $2440

Sony

CPD1430s 14" 1024 .25 NI	($549)$566
CPD1730 OEM 17" 1024 25 NI	($879)$899
GDM17SE 17" 1600 .25 NI	($1188)$1235
GDM2036S 20", .1280NI, MPRII	($1989) $2059
GDM2038 20".	($2249) $2329

Sampo

Sampo KDM1767 17" 28.	($699)$719
Sampo 1777 17" .28 Microp	($815)$840
Sampo 2055 20" .31	($999)$1039
Sampo KDM2077 20" NI 1280 .31	($1439)$1495

NEC

3/4FGE 15", .28, 1024..	($599) $626/($715) $738
5FGE/FG P17", 28,	($1095) $1149/($1425) $1475
6FG 21", .28, 1280NI	($2375)$2440
6FGP21", 28,1280NI.	($2499)$2559

MAG

LX1564 15" .28, 1280NI	($399) $415
MX15F 15"MPR II	($499) $519
MX17F,17".26,1280NI,Mic Org	($899) $925

MISC.

MAGNVX20CM64 20", 1280, .31.	($1210) $1250
NOKIA17"447BTrinTb.25dpi,1280	($1070) $1175
Mitsubishi 15FS DiamondScan	$490
Mitsubishi 17FS DiamondScan	($999)$1039
Mitsubishi 17 DiamondPro	($1058)$1098

(We do not have the CAD monitors on display and carry only a few in stock - these are on Just-In-Time inventory basis - please place orders in advance)

MULTI MEDIA

CD-ROMs

IDE

Mitsumi Kit 350msec, 150 KB/S	$149
Panasonic 562 DblSpd 320ms, 300kb/sec	$209
Sony 31A-03,DblSpd 300KB/sec w/Kit	$209

SCSI

NEC CDR-5/600 280ms 300KB, I/E	$475/565
NEC 3XI Multi, 195ms, 450kb/s	$495
TOSHIBA 3401B/E 200ms, 300kb/s I/E	$349/459
Texel 3028/5028 240ms, 335kb/s I/E	$269/379
SONY CDV561, 295ms, 300kb/sec.	$336
Microsolution,350ms,Parallel port	$339

Sound Boards / MPC Kits

Hyena Sound Blaster Comp Sound Card	$49
Hyena w/ Speaker, Joystck mcrphn, games	$75

MEDIA VISION

Pro Audio 16 Basic	$119
Pro Audio Spectrum 16 ORG/OEM	$159/139
Pro Audio Studio 16/Power Pack	$199/69
Fusion Double CD16 Kit Int/Ext	$475/495
Pro 16 Multi-Media System/II	$609/764
Pro Movie Spectrum/Studio II	$279/309

CREATIVE LABS

Discovery 8/16 Upgd Kit.	$369/429
Edutainment 8/16 Upgd Kit.	439/489
Software Dev Kit	$99
SoundBlaster 16 Basic/SCSI II	$129/179
SoundBlaster 16 ASP SCSI/MCD	$209/189
Sound Blaster Voice Editor	$55
Wave/Video Blaster	$179/305

MISC

Logitech Fotoman Digital Camera for PC	$465
Logitech SoundMan 16	$109
Intel Smart Video Recorder	$520
Cardinal Tech Digtl Sound Pro 16/Plu	$145/186
Video Logic Captivator Kit,win3:1	$369
Future Domain SCSI CD-ROM Kit	$69
Midi Mate/CDPC XL	$49/1059

COMMUNICATIONS

96/24 Snd/Snd&Rec Fax/Mod, Int	$30/46
96/24 S&R F/M, v 42 bis Hrd/Pocket	$63/89
144/144 S/R F/m, v.32, v.42, I/E	$122/174
Pocket 144/144 S/R F/M, v.32, v.42,	$199
PCMCIA144/144 F/M v.42, MNP2-5.	$306
PCMCIA 96/24 F/M v 42, MNP2-5.	$195

AT&T Paradyne

DataPort 14.4 Fax V.32bis Ext	$249
DataPort 14.4 Fax V.32bis Internal .[205*]	$225

US ROBOTICS

9600 Sprtstr Modm V.32 V.42bis I/E	$146/152
9600 Sport Mod/fax V.32 V.42bis I/E	$159/168
14,4 Sport Mod V 32bis V.42bis I/E	$155/173
14,4 Sport Mod/Fax V.32b V.42b I/E	$160/192
14,4 sporst Mac Mod/fax.	$214
14,400 HST Courier Dual V 32bis	$759
Modem Sharing Single/Dual Kit	$495/889

INTEL

Satisfaction 100/200/400+Fax Int	$105/295/389
Satisfaction 400+Fax Ext	$409

NATIONAL SEMI-CONDUCTOR

TYIN2000 Fax,Mod,Answer M/C,Audio Play.	$175

ZYXEL USA

U-1496 +/E 16.8Ext,14,4 Fax,Voice	$355/675
U-1496B 16.8Int,14,4 S/R Fax,Voice,Win	$355
U-1496B+ 19 2Int,14,4 S/R Fax,Voice,Win	$460
U-1496+/E+ 19 2Ext,14,4Fax,Voi,**Mac**	$495/675

AT ASA... ...WE DELIVER

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See Networking Seciton too

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Norton Utilities v7.0/upg	$108/94
Norton Desktop for Windows v2.2/2.0	$104/106**
After Dark 2 0 for Windows	$25
MS Windows NT/upgrade	$311/263
IBM OS/2 2.1/ upgrade	$147/99
DESQview /X v1.2	$163

GRAPHICS & DESIGN

Pagemaker 5.0 for Windows	$495
QuarkXPress for Windows	$565
Adobe Photoshop 2.5 for Windows	$541
Micrografix Designer v4.0/upg	$435/197
FrameMaker for Windows/upg	$572/193
MS Publisher V1 for Win	$129

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MS Ofice Pro v3/4 for Win	$529/620
MS Project 3.0 for Windows/upg	$448/148
Smartsuite 2.1 for Windows/upg.	$455/339
Lotus Notes starter pack for Win	$858
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ACCPAC AUTHORIZED DEALER

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CASES

Baby Desk/Mini Tower w/ PS	$47
Medium Tower	$75
Full Tower/Big Tower- 300P/S	$89/169
Rack Mount W/PS	$289
File Server w/ 400W PS, 3 Fans 12 F/HDD	$439

DIAMOND (For Black add $5)

Baby Desk/Tower w/PS	$74
Medium Tower Reg/Big w/PS.	$89/108
Full Tower w /PS	$119

External HDD Cases

1HH. .65W	$89
1FH/2HH...65W	$110
2FH/3HH 65W	$137
SCSI Cables Int/Ext	$9/10

Power Supplies

PS2 200/300W	$40/95
PS2 200W **GREEN PC**	$55
Full Tower 230/300/400W	$58/80/154

KEYBOARDS, MICE

Spill Resistant/Mitsumi	$20/17
MaxiSwitch/KeyTronic	$32
Small 11 5" 88 Keys/**BLACK 101**	$32
Russian Keyboard	$24
Japanese Keyboard, 106 Keys	$70
SEJIN J-Mouse (mouse under 'J' Key)	$89

Also line of European/Arabic KBs

S-Mouse/TBall	$9/21
LogiTech wht box Ser/Bus	$26/45
LogiTech Mouseman Cordless	$77**
LogiTech Trackman Portable	$66**
Microsoft white box S/B	$39/69
BLACK SERIAL	$19

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PLOTTERS

HOUSTON INSTRUMENTS

HIPlot 7100 A-D,8 Pen,	$
HI-162R A-E, 8 Pen, Roll Feed	$4496
V50 INKJET A-C SIZE,2MB BUFFER	$1410

DIGITIZERS

SUMMAGRAPHICS

III 12x12 w/16btn or 4bt & Pen	$299
III 12x18 w/16btn or 4bt & Pen	$549

KURTA

XLP 12x12 w/4btn & Pen	$249
XLP 12x18 w/16btn or 4btn, Pen	$529
IS/ONE 12x12/12x17 4btn/12btn /Pen.	$329/530
(IS/ONE also available w/Cordless 4btn or Pen)	
XLC 18 x 24/24 x 36	$1070/1260

CALCOMP

CALCOMP 12 X 12/12 x 18	$279/629
CALCOMP 18 X 24	$1275
CALCOMP 6 X 9/12 x 12 P Series	$439/485

SCANNER

LOGITECH (HAND-HELD)

SCANMAN-COLOR/w OmniPage	$439/479
SCANMAN 256GS / w OmniPage	$159/199
SCANMAN 32GS / w OmniPage	$135/125
SCANMAN EASY TOUCH	$219

MICROTEK

SCANMAKER II/IIXE 1200dpi, MAX	$659/1038
ADF-600 Automatic Sheet Feeder	$480
SCANMAKER 35T,1800dpi,w/Photostar	$1399

MUSTEK

COLORARTIST hh,400dpi,256&colr w/OCR	$299
MFS-6OOOCFB 600dpi,16mill clr,w/Perc	$815
Paragon 600(dpi)24 bitclr,PhotoshopLE	$679
Paragon1200(dpi)","	$1219

UMAX Technologies

UC840,1600dpi,16.8 million colors	$1239
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UC120SE,24oodpi,16 8 million colors.	$3039

UPS's

AMERICAN POWER

APC-BK250, 7 min, 386SX, ws	$99
APC-BK400, 10 min. 286, 386SX, ws	$163
APC-BK600, 15 min, 386 486 FS.	$265
APC-BK900/1250, 15 min, Multi FSs	$379/506
Power Doctor/Call UPS	$70/99

SMART UPS (ON-LINE/AUTO BACKUP)

APC 400, 10 min, 286, 386 FS/WS.	$304
APC600LS, 15 min, 386, 486 FS/WS	$394
APC900, 15 min CAD/CAM WS/FS	$569
APC 1250, 15 min, Multiple FSs	$747
APC 2000, 20 min, Mini Computers	$1170
Matrix UPS 3000 VA, Multi-server	$2679
SERENA 5.25" 300VA UPS mounts in PC.	$call

INTERFACE KITS/SMART MONITORING

Power Chute SCO Xenix	$84
Power Chute Plus for Novell/Unix,Xen.	$72/115
UPS Monitoring Board for Novell	$69

PRINTERS

Star Micrnix NX1001 9 Pin.120/220V	$134/144
Star Micronix 220v quantity of 100 only	$135
IGOR 132 9Pin Wide **220V** (Cyri..).In stock ......with any purchase	$110

EPSON

Action 2250 9 pin	$129
LQ 1070+ 24 pin Wide	$399
Stylus 300 Inkjet 360dpi	$249
Stylus 800 Inkjet 360dpi	$298
Action Laser 1000 300dpi,6ppm,512k	$615
ActionLaser 1500300dpi,6ppm,1mb	$689

CANON

BJ 200,360dpi,49k,7fnts,248cps,4ppm	$299
10SX,110cps	$269
BJC 600 Color,240cps	$649
BJC 820 Color,24cps	$1635

OKIDATA

OL400e, 4ppm, 300dpi	$539
OL810, 8ppm, 300dpi	$955
OL830 Plus, 8ppm w/ 2MB post script	$1189
OKI ML184T dot matrix, rugged industrial	$229
OKI ML320 320cps 9pin	$315
OKI ML590 24 pin .auto form sensing	$464

PANASONIC

KX-P2123, N-Carr, 240cps, 360dpi, 10fnts	$255
KX-P2124, N-Carr, 320cps, 360dpi, 12fnts	$335
KX-P1624, W-Carr, 192cps, 360dpi, 14fnts	$415
KX-P4410,5ppm,300dpi,28fnts,512k	$599

CITIZEN

200GX 9 pin. dual feeder, park.	$139
GSX230 24 pin.8 fonts, 270cps	$249
(color option for Citizen 80 col printers	*$45)*
GSX240 24 pin wide.....300cps, 13 fonts	$315
Notebook Pr. CTZPN48 w/bat	$290

MEMORIES, MATH-COs

SIMMs/ESIMMs/SIPPs/DRAMs

256x9/70	$12
1Mx9/70/60	$39/42
4Mx9/70/60	$149/165
1M/2M/4M x 36 - 70	$149/349/595
DRAMs, and other SIMMs	available

FAST MATH-COs

by CYRIX / INTEL / IIT

2C87-10/XL	$32/$39
3C87SX-16/20/25	$45
3C87SX-33.	$49
3C87DX-25/33	$49
3C87DX-40	$49

Laser Ext Memories

HP IIP, IIIP	2/4MB	$114/195
HP II, IID	2/4MB	$124/199
HP IIISi	1/4MB	$76/204
HP IV	4/8MB	$185/387
Pan 441/2/30, 4450i	2/4MB	$148/215
Pan 4450	1MB	$137
Pan 4455	2MB	$164
Oki400	2MB	$119
Oki 800, 820	2/4MB	$123/193
Oki 810	1/2MB	$111/189
Epson 6000	2/4MB	$134/205
Epson 4000/8000	1/4MB	$131/216

NETWORKING

ETHERNET Adapters

NE 2000 Comp 16bit Coax/10BT	$46/46
NE2000 Comp Combo soft. config	$54
D-Link 16 Bit,SoftConfig. 10BT 1/6 Pack	$74/429
Intel EtherExpress 16/5pk/20pk	$104/479/1825
Intel EtherExpress 16 MCA/16 MCATP	$171
Intel EtherExpress 32 EISA Coax.	$419
Intel EtherExpFlash/C/5pk/20pk	$115/485/1845
SMC Ethcard 16 UltCx/6 Pk/24pk	$109/574/2149
SMCEthcard+IA for MCA/TP	$179
SMCEthcard+Elite16 Cx/TP1/6/24	$119/615/2289
3 Com 503 Etherlink II 16 Bit Coax/TP.	$159/169
3 Com 507 Ethlink II 16 Bit Coax/TP	$279/299
3 Com 509 Ethlink III Coax/5Pk	$119/505
3 Com 509 Ethlink III Combo/5/20.	$145/559/2199
3 Com 529/579 EISA Coax/10 BT/5pk	$229/959
EagleNE2000 Plus /5Pk	$109/459
EagleEP2000 Plus/5pk	$92/405
Asante Etherpack2000+ Coax/10 BT	$129
Microdyne NE2000 Plus	$109/94
HP Ethertwist PCLink/6pk	$159/759

ARCNET

16bIT Star/bus Topology-combo	$65
4Port Passive Hub	$15
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ADAPTERS for TOKEN RING

Intel Token Express 16/4 ISA/MCA	$429/469
SMC Token Ring Adapter 16/4	$345
3 Com Tokenlink III 16/4 ISA/EISA	$455/635
IBM Token Ring Adap II	$289

POCKET LAN ADAPTERS for Notebooks

Advanced LAN Net Coax/10BT	$129
XIRCOM PE3 10B2/BT/BC	$269/269/305
DLINK DE-600 Softconfig. Coax/10BT	$179
ENET III Combo.	$325
Token Ring Type 1/3 16MB PS	$559

PCMCIA ADADAPTERS for PalmTops

NATIONAL NE4100 COAX/10 BASE T	$215

HUBS

8 Port Coax Stackable Active Hub	$139
Allied Telesis 8 Port/12 Port.	$309/519
Asante 8 Port Concentrator/12 Ports	$225/475
Asante 1012 12 Port Hub.	$835
Asante 1701 Smart Hub 12 Ports/SNMP	$965
CeLan 10 Base T 8/10 port Hub	$199/429
Microdyne 18 port 10 Base T5000 series	$619
D-Link 12 Port 10 BaseT	$495
D-link DE-1500 w/SNMP	$875
D-link K1032 32Port w/SNMP	$1199
Intel EE 12 Port 10 BT Hub Int w/Harmonica.	$634
Intel EE 12 Port Hub Int EISA w/Harmonica.	$699
SMC 8 Port Concentrator/12 Ports TP	$325/599
Synoptics 2800 A 16 Port w/AVI	$699
Synoptics 2803 16 Port w/AVI	$749
Synoptics 2804 16 Port w/Fiber Optics	$951
3 Com Link Builder 3C621 12 Port	$729
3 Com Link Builder TR 3C510180/82	$1751/3599

BRIDGES

Allied Telesis local Ethernet Bridge	$1645
3 Com 802C NetBuilder local Ethernet	$3399
3Com 750 NetBuilder Token Ring local	$4714
3Com 5823C NetBuilder Remote	$5319
Synoptics 3323S Ether Local w/AVI	$2353
Synoptics 3522 Token Ring	$5319
Novell Multiprotocol Router v 2.0	$669

NETWORKING

NETWORKING SOFTWARE

NOVELL NETWARE

Ver 2.2 5/10 User	$455/1050
Ver 3.12 5/10/25/50 User	$639/1399/1795/2575
Ver 3.12 100/250 User	$3365/6499
Ver4.01 5/10 User	$859/1899
Ver4.01 25/50 User	$2125/3360
Ver4 .01 100/250 User	$4929/6720
Ver4 .01 500/1000 User	$15375/27995

(Novell upgrades available)

NOVELL-LITE	$69

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ADD-ON Starterkit w/soft,cards,etc.	$269
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CC:Mail DOS/Win	$199/325
CC: Mail UNIX/OS2 Platform	$639/339
CC:Mial Macintosh Platform	$335
CC:Mail 10/25/100 user Pk.	$229/549/2097
CC:Mail Gateway v. 3.21	$845
CC:mail Remote/Router v 4.0	$195/849

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ASA

(2) copies of Novell lite, (2) NE 2000C Cards, Cables, Terminators etc	$249

ARTISOFT PRODUCTS

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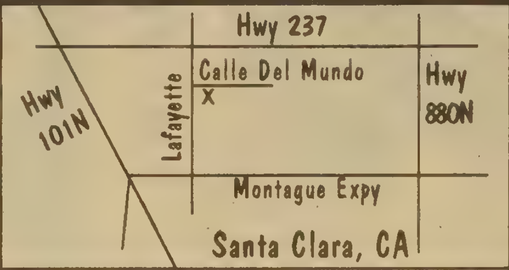

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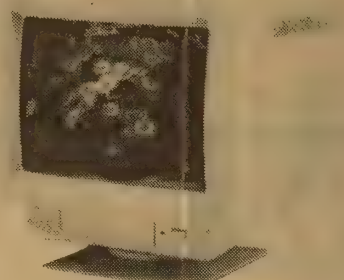

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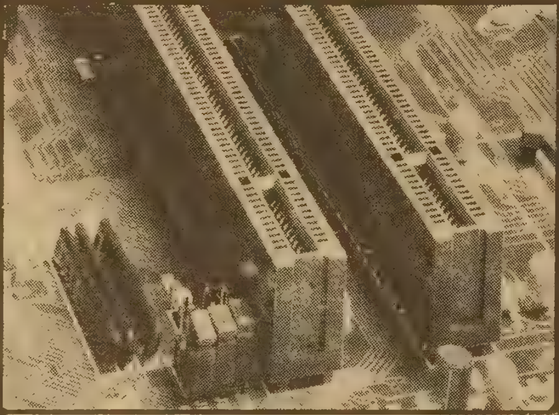

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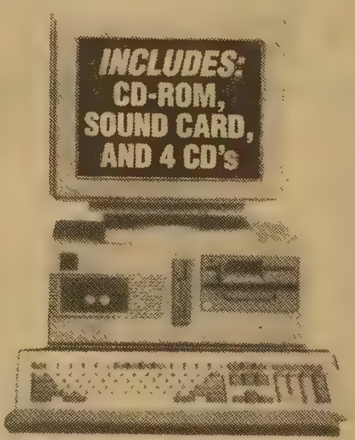

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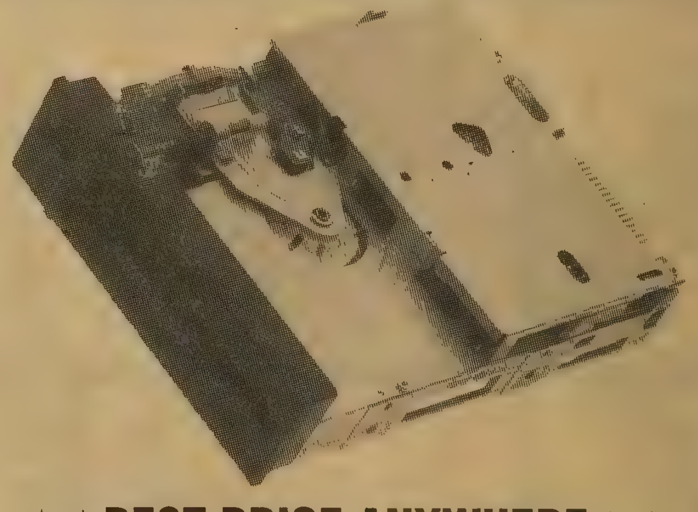

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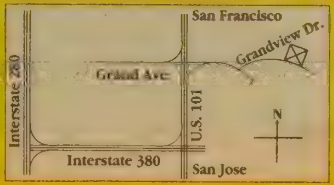

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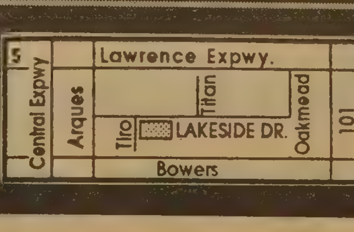

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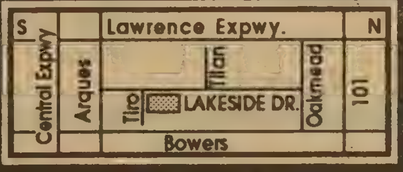

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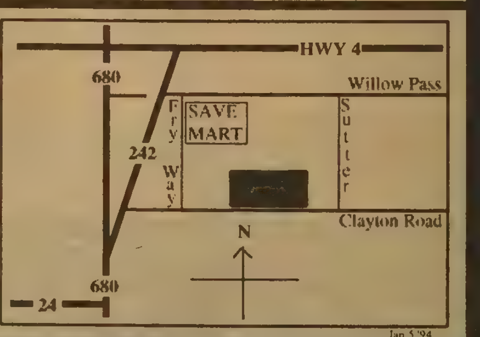

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PC Magazine Dec. 7, 1993

Specifications:
Accelerator: IIT AGX-015
Fast VRAM
High Refresh Rate (up to 90Hz)
Supports VESA LOCAL BUS (VL-BUS)

Driver Supports:
Windows 3.1
Windows NT 3.1
AutoCad R.11, 12
AutoShade R.2.0
VersaCAD Ver 7.0
CADKey Ver 6.0
PCAD Ver 5.0
Lotus 1-2-3 R.2.X
WordPerfect 5.1
MicroStation 3.1, 4.0 or later
OS/2 Ver 2.1

Resolution	1 MB	2 MB
640 x 480	16.7 M Colors	16.7 M Colors
800 x 600	64K Colors	16.7 M Colors
1024 x 768	256 Colors	64K Colors
1280 x 1024	16 Colors	256 Colors
1600 x 1280		16 Colors

SPiDER VLB PLUS

Specifications:
Accelerator: Cirrus Logic 5428
72 Hz Refresh
Supports VESA LOCAL BUS (VL-BUS)

Driver Supports:
Windows 3.1
Windows NT
AutoCad R.11, 12
GEM Ver 2.2
Lotus 1-2-3 R.2.0, 2.1, 2.2
Symphony R1.1
Ventura Publisher Ver 1.1, 2.0
WordPerfect 5.0, 5.1
Wordstar 4.0
Autodesk 3D Studio
OS/2 Ver 2.1
AutoDesk-Shade Ver 2.0
PCAD
MS-Word

Resolution	1 MB	2 MB
640 x 480	16.7 M Colors	16.7 M Colors
800 x 600	64K Colors	64K Colors
1024 x 768	256 Colors	64K Colors
1280 x 1024	16 Colors	256 Colors

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- 8K Internal Cache
- 128K External Cache Exp. to 256K
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- 1.2 or 1.44MB Floppy Drive
- 1:1 Interleave HD/FD Controller
- Tower or Desktop case w/power supply
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Intel 80486SX-25MHz CPU

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- Tower or Desktop case w/power supply
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- Tower or Desktop Case w/Power Supply
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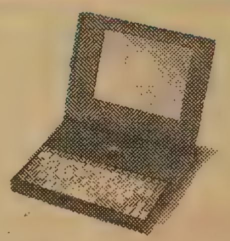

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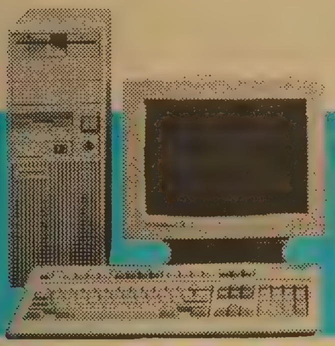
- 101 Enhanced Keyboard



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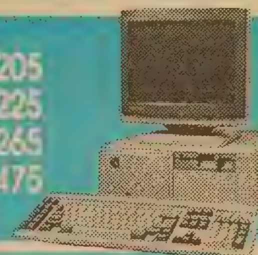

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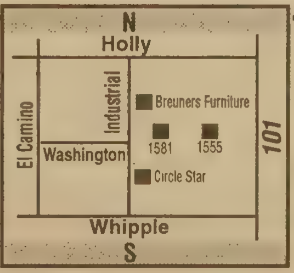

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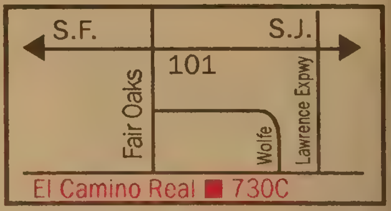

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486DX-50/128K ISA/VLB	$464	$602
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486SLC2-50/64K VLB	$214	$350
486DLC-40/128K VLB	$145	$282
486DLC-33/128K VLB	$136	$273
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486DX2-66/256K ORCHID VLB	$573	$705
486DX-33/256K ORCHID VLB	$386	$519
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486 DX-40/128K ISA/VLB	1029
486 DX-33/128K ISA/VLB	1036
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486 DX-33/256K AIR VLB	1090
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486 DX-33/256K ORCHID VLB	1240
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Orchid Celsius 1MB	220
ATI Graphic Ultra plus w/2MB	230
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ATI Graphic Ultra Pro VLB w/2MB	315
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Adaptect EISA SCSI 2742TK	355
Adaptect SCSI 2842 VLK	295
Ultra Stor SCSI 14F/24F EISA	190/350
Ultra Stor SCSI 34F VLB	260

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Maxiswitch	28
Keytronics	30
Focus 2001/8000	36/60
Omnikey 101/102/Ultra	75/75/90

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Fax Modem (14400 F, 14400 M)	120
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US Robotics Fax/Modem 14,400	170
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Microsoft mouse serial/bus/new	40/60/40
Logitech Mouseman serial (4000dpi)	40
Logitech Mouseman Bus (4000dpi)	55
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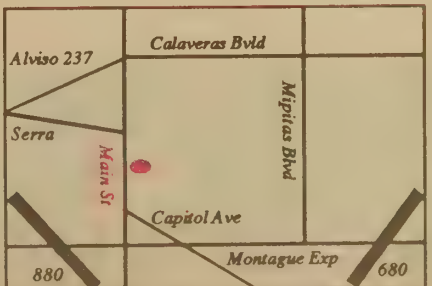

Surfing The Third Wave

Alvin And Heidi Toffler On Life And Work In The Information Age

By Mary Eisenhart
Photo: Michael Jay

For almost three decades, Alvin and Heidi Toffler have been thinking and writing about the impact of technology on people and culture. In several books, notably *Future Shock, The Third Wave,* and *Powershift,* they've considered events around the world and their implications for social change; their findings are widely studied by governments, businesses, and ordinary citizens trying to make sense of an increasingly chaotic world.

Their current book, *War and Anti-War,* analyzes the parallels between business and military organizations in the information age—as with business, the military is evolving away from traditional command-and-control structures and becoming increasingly dependent on smaller, smarter, more efficient groups of people using ever-more-complex technology.

Since the Tofflers' views are integral to such recent phenomena as "downsizing" and "just-in-time manufacturing," to say nothing of the very existence of the personal computer industry, we were glad to have the opportunity for a conversation with them during a recent visit to San Francisco.

A lot of our readers probably weren't born when *Future Shock* came out, so could you do a brief summary of the previous books and where *War and Anti-War* fits in?

Alvin Toffler: In *Future Shock,* Heidi and I wrote about the acceleration of change, driven to a considerable degree by technology, but not entirely. We wrote that book in the late '60s, and it was published in 1970.

In that era, in that distant epoch, nobody yet appreciated that things were speeding up. We had to fight to make the case that the pace of life was becoming more rapid, that technological and social changes were more and more rapid, and so on. The book made that case, and it also argued that there's an upper limit to the capability of any system, whether it's a computer system or a human biological system, to cope with change; that below a certain level human beings are understimulated, and above a certain level of change, a certain rapidity or complexity of the changes they face, they are subject to maladaptation or difficulty.

We call that "future shock"—when too much change hits too fast for people to absorb, they then began to show signs of either deteriorated decision-making capability or disorientation; indeed, in some cases, stress and illness and so forth.

What was happening at the time that suggested this to you?

We wrote an article in 1965 for a magazine called *Horizon* called,"The Future as a Way of Life." In that article, we argued this case: that things were accelerating, that long-range planning or long-range thinking was going to be necessary, and that there would be difficulty in adapting to the speed of change. We coined the word "future shock" in that article in 1965.

I can remember when the term occurred. I was interviewing a friend, a psychologist, on the telephone, about culture shock—the disorienting effects of suddenly being thrust into a completely alien world. In the course of that conversation, as she described the symptoms or the consequences of that, it occurred to me that you could be plunged into an alien culture in your own society if an alien future arrived more rapidly than you were prepared for.

So we said that future shock is the consequence of the premature arrival of the future. And that book, which we thought would have a modest success, turned out to be a humongous bestseller all over the world. Indeed, it was the fourth- or fifth-best-selling nonfiction book in the entire decade of the '70s, and lent the term "future shock" to the language—it's in many dictionaries, it's in headlines every day of the week, and so on.

That, then, was followed by another major book in 1980 called *The Third Wave,* ten years after *Future Shock.* That book said that the changes around us are not entirely random, that you can see patterns, and that basically what was happening was a revolutionary upheaval on a par with, or even greater than, the industrial revolution—or indeed the agrarian revolution that came first. We used the terminology First Wave, Second Wave, Third Wave.

The first wave of change was ticked off by the agriculture revolution, when some prehistoric Einstein, probably a woman, planted the first seed. That was the invention of agriculture, and it spread slowly, until now virtually the entire world is capable of agriculture, except for a few remaining tribal or nomadic populations. Basically the whole world has learned the game of how you make nature grow things.

Then came the industrial revolution of two or three hundred years ago, which launched what we call the second great transformatory wave in history, and gave rise to an industrial civilization. That industrial civilization had multiple forms. It had capitalists and communists; it had Japanese, Korean, Swedish, or American versions; but all of the industrial countries, by definition, were based on mass production, mass distribution, mass consumption, mass education, mass media, mass entertainment. Sociologists referred to it as the mass society.

The old scenarios, the scenarios of Orwell and Huxley and hundreds, if not thousands, of science fiction writers, saw the continual advance of technology as necessarily increasing the industrial character of society—making it more bureaucratic, more centralized, more impersonal, more robotoid, and so on. Both in *Future Shock* and then with much more detail in *The Third Wave,* we argued that in fact a turn was taking place; that the third wave, while it was technological, was not industrial, and that there's a distinction between these two; and that especially the rise of the computer, but also many other technologies linked together, were giving rise to a new kind of society, or civilization as we call it, that contrasts with the mass society produced by industrial civilization.

It is what we call a demassified society. It is heterogeneous; it has much more room for diversity. And the computers, rather than suppressing diversity, have in fact made possible and fostered a high degree of diversity, particularly as we shifted from the mainframe to the PC. So you now move from mass production to demassified production of customized products—small-run production.

In parallel, you move toward demassified micro-markets—boutiques, targeted catalog shopping, etc., as examples. You move toward a more diverse family structure—not everybody's in the nuclear family any more. In fact the working father, stay-at-home mother, with two kids under eighteen probably represents under 5% of the American population today. Instead of nuclear, we have a wide variety of family forms.

We sometimes summarize the changes in terms of a biological analogy: that society is going through cellular differentiation and a speedup of metabolism at the same time.

Then came *Powershift*, which we published ten years later in 1990. *Powershift* focused more directly on the implications, particularly the economic implications, but more generally the power implications, of a society in which knowledge has become the central economic resource. It focused a lot on the economy, on business; talked some about the future of the nation-state and of politics; and did a very quick rough sketch of some of the global implications but didn't focus closely on them.

This new book, *War and Anti-War*, takes as its premise that knowledge stands in a new relationship to economic production. The book looks at the implications of this for both economic power and military power. Knowledge now becomes central to both kinds of power on the planet. Now, what does that mean in terms of conflict, war, peacekeeping, and the global system?

We don't regard this book as part of the trilogy that was formed by *Future Shock*, *Third Wave*, and *Powershift*, but it clearly comes out of the same brains and applies some of the same kind of thinking, this time to a special problem. Rather than to how civilization is changing as a whole, it looks at the process of conflict.

My understanding is that you see the military world experiencing more or less the same kind of change the industrial world is experiencing. As we have just-in-time factories, we are now moving to a just-in-time military?

That's right. That's right. Absolutely parallel. For one thing, the role of information is growing in importance in both the economy and in war.

The military is undergoing a set of changes that directly parallel the changes taking place in business. One example, of course, is demassification. Because of computer controls and numerical controls and information technology, we now are capable of producing short runs of products economically, instead of the traditional industrial-style assembly-line long runs of mass production; if we're capable of demassified production, precision targeted weapons are the parallel to that—that is, demassified destruction.

If companies are downsizing, not just because of the recession but because they're restructuring into smaller work units, the military is doing precisely the same. We're moving into a military situation in which a brigade can do what a division used to be able to do, given information-intensive technology.

Heidi Toffler: Therefore we don't need thousands of tanks produced assembly-line fashion in the future; and, since the military is smaller and more information-dependent, and you can upgrade the electronics in a tank, you don't need factories mass-producing. So that weakens the military-industrial complex.

AT: It weakens the *second-wave* military-industrial complex. In the third wave, the military-industrial complex disappears. It melts into a civilian-military complex, with the emergence of dual-use, or multiple-use, technologies.

More and more weaponry is going to come off the shelf, or more complexly, be configured out of pieces of different technologies off different shelves, assembled into weapon packages. What we've been saying to people, trying to make them wake up about this, is that someday a company like Revlon is going to produce some nice innocent cosmetic which just happens to be a precursor to somebody else's chemical weapon.

HT: People think that the recent budget cuts are what have fueled the de-scaling, but I think big companies like Hughes and General Dynamics have known this for years.

AT: Corporate America is, on the one hand, driven by the recession to lay off people. But it is also restructuring, so that they're not going to put those people back on. Work is taking place in smaller groups, and the same thing is true in the military. Fighting is taking place, or will be taking place, in smaller groups.

Similarly, we're going to be moving toward increasing robotization, driven by hypercompetition in the global market. The military is going to be moving toward robotization. In *War and Anti-War* we discuss the philosophical debate over the degree of autonomy that robots ought to be permitted.

What if they're too smart and they take over?

AT: Yes, exactly.

HT: The truth is, the smarter the machine is, or the smarter the programming in it, the less smart you have to be.

AT: But the more smart you have to be to control the system.

So there are these many parallel changes. Systems integration. We now know that companies are engaged in very, very complex interactions. They have lots of subsidiaries and profit centers, and they're dealing with large numbers of customers, and they've got custom-made relationships between the customers and themselves. And they need computer systems and information systems to keep track of their tens of thousands or even more products.

They can't do that without the computer. If you do that with a computer system, and then you link into the network that connects you to the supplier on the one side and the distributor or retailer on the other side, you have to have systems integration.

It's exactly the same for the military. There are many problems, but the military has the problem that when an air tasking order is created for the Gulf War, there are permutations of literally tens of thousands of factors that have to be fed into the computer in order to "deconflict the skies." So there is a heavy requirement for systems integration. Systems integration in turn requires a heavy electronic infrastructure. And therefore more networks, and therefore more technologies for data transfer, and so forth.

So everything that is happening in the civilian economy is paralleled in war. Everything we're doing for *production* is paralleled in what we're doing for *destruction*.

You've said that second-wave entities are predicated on hierarchical structures where the people at the top know everything the people on the bottom need to do, whereas in third-wave structures the person on the bottom is the one who's dealing with the situation in real time, and so they're the ones who have to know this stuff.

HT: There has to be feedback. The top can't continue to function unless it gets feedback from the bottom, and from all the levels.

AT: But the key hidden fact that no one talks about in traditional hierarchical bureaucracies, is the assumption made by the people on top that they know what the people down below need to know. That's just not tenable any more.

HT: They didn't even have to *ask* the people on the bottom. They *knew*.

AT: They said, "You're going to handle this job, and in order to do that, you get this information and report to this line. You're going to handle that job..."

Well, the reality is that it's so complex now, and shifting so rapidly, that people on top are the last ones to find out what's going on, and that's why this whole discussion of "empowerment" is not a result of altruism or New Age feelie stuff—it's that you can't make a profit, you can't make a product, the old way. You *have* to empower to a certain degree the people who are actually doing that work. Because now they're the ones who know, and they can tell you what you cannot tell them.

You've said on occasion that you used to work in a factory.

HT: This was when we were very young. When we graduated from the university in 1949 there was a recession in this country, quite a severe one. I remember the best job I could get, and you needed a college degree for that, was an airline reservation clerk. That was my first job after I graduated.

Heidi Toffler:

"We travel around corporate America today, and I sometimes find these old-time CEOs who try to tell me how efficient the factories were in the old days. They were not efficient *at all*."

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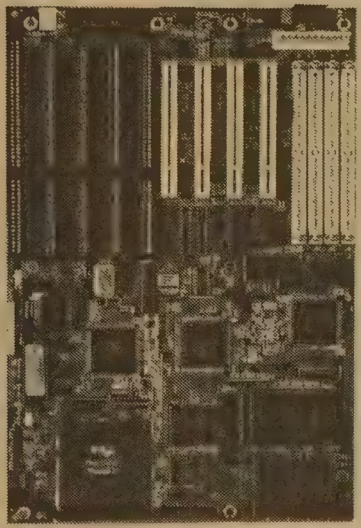

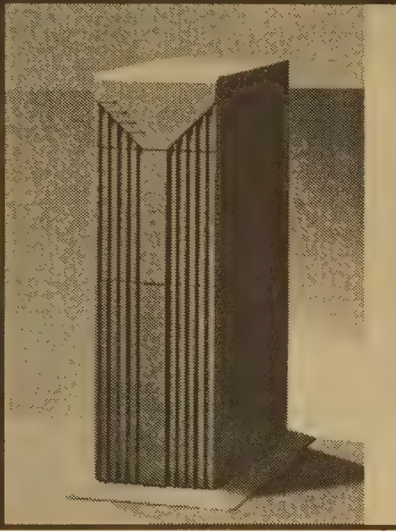

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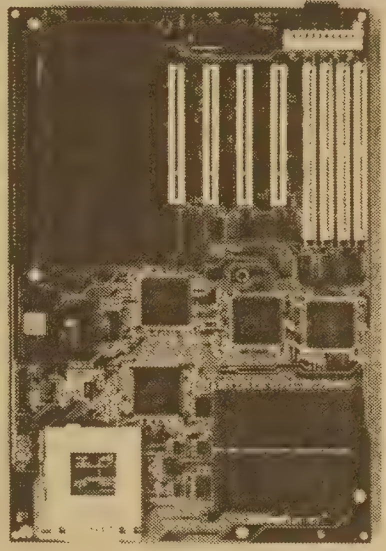

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It was on a swing shift—two weeks from 8 am to 4 pm, two weeks 4 to midnight, and two weeks midnight to 8 am.

So you always had jet lag.

HT: *Aaah.* It was unbelievable.

AT: On the ground!

HT: I could not do that job more than six months, because when you change every two weeks, it takes about two weeks to get adjusted. It was just an impossible job, but it was the only job I could get, and it paid 40 or 45 dollars a week. And you had to be a college graduate.

So we both left New York about then and went to the Midwest. My first job there was in a library, also for 45 dollars a week. But the factories were paying better—about $1.85 an hour.

AT: I never got that. I got $1.49 and then $1.53.

HT: So I made more money in a factory than I did in the library or at Eastern Airlines reservations. And I did not have to work that horrible swing shift every two weeks.

My first job was for General Electric, and I did not tell them on the application that I had a college degree because I knew that would disqualify me. I would have been "overqualified."

So I neglected to put that down, I put down high school diploma, and I got the job. I made light bulbs at a machine for a year. The job was mindless, it was boring. I asked many times—they were very small light bulbs—what these light bulbs were for. And no one would tell me.

AT: Or nobody knew.

HT: No! I'm sure somebody knew! [*laughter*] But why in the world would I need to know what the light bulbs were being used for?

Did they ever tell you you weren't being paid to think? I always used to love that one when I was working in retail...

AT: Yes! All the time! All the time!

HT: Yes!

I've given this illustration many times: I knew my machine fairly well. It was simple. I had filaments in one hand and a tweezer in the other, and with the tweezer I put the filaments into the gas jet slots as they went by. The machine moved every second or so and a new gas jet came in front of me—it was a circular machine. And then at one point the glass came down over it, and at another point the fire came out and melted the glass. Then at another point it went down the chute to the machine below me.

When my machine broke down, I knew why it was broken. I could not call the maintenance foreman and say, "Call somebody to fix the machine, this is what's wrong with it." I had to call *my* foreman.

My foreman would come over. He'd go "Hm?" I wasn't supposed to tell him what was wrong, because I wasn't supposed to know, because I was too stupid. So then he would call upstairs, where the white-shirted people were who came to visit on the shop floor about once a month. He would call one of them. One of them would call the maintenance foreman. The maintenance foreman would then call my foreman. They would decide that they would send a mechanic to the machine. The mechanic would come. I would tell the mechanic what was wrong and how I thought he should fix it, and he fixed it.

In the meantime the machine was down for two hours. I could have called the mechanic in the first place and told him what was wrong—and it would have been fixed in ten minutes.

Now, we travel around corporate America today, and I sometimes find these old-time CEOs who try to tell me how efficient the factories were in the old days. They were not efficient *at all.* They were *inefficient.* But we devastated Europe and Japan during World War II. So we had no competition afterwards and we could make a profit even if our companies were inefficient.

AT: It didn't matter if we were inefficient.

HT: So talking about the wonderful productive capacity and the worker productivity—this is all a fantasy in the minds of these old managers. It's much more efficient now in smaller workgroups.

Very frequently we ran out of glass or some other thing—

They hadn't found out about just-in-time ordering...

HT: No. They were inefficient, but they thought they were efficient.

I think that illustrates many components of second-wave style factory management. The same was true when I worked in the aluminum foundry—there, I was an elected UAW shop steward, and I was always getting in trouble. At least the management would talk to me then, but if I got too obstreperous I was sent to a room which was off in the corner...

Alvin Toffler:

"We need a better economic system. We cannot just throw millions of people out of work without doing something about that—but the solution is not to go back to that old system. We have to go to a smarter, not a dumber, production system, which in turn requires smarter, not dumber people."

AT: Siberia!

HT: ...that broke up the sand cores and took the grommets out and put them on a belt. They were punishing me, keeping me away from my workers. I mean, this is what you do to children in school, you don't do this to adults.

And they also visited the factory floor about once a month.

I *believe* we made airplane engines. I again asked—now, I was a union rep. I was still considered too stupid to know what we were making.

And I think all of the workers were exceedingly smart. They knew—when the time-study men came in the front door of the factory, the word went around very quickly, "Slow down today." These were games that were played. But the management really thought we were too stupid.

Of course they wouldn't have brought time-study men in if they didn't.

AT: It was the epoch of Taylorism. This was the time when Taylorism was in flower.

And apparently Taylor was deeply chagrined at what use his work was put to, because he thought the workers would get the payoff from all this increased efficiency...

AT: [*laughs*] And they didn't!

HT: They just retimed the jobs so you had to produce more if you were doing piecework jobs. I was a core paster, and this was piecework. But they also took none of the human factors into account, that in the morning you're more awake, you feel better, you're producing more; in the afternoon you get tired, so you work slower. I mean, this was the machine model of the human being also.

AT: So what we resent today are people who continually glorify that kind of labor, and say that's what we need. The fact is that it's dehumanizing, brutalizing labor.

We need a better economic system. We cannot just throw millions of people out of work without doing something about that—but the solution is not to go back to that old system. We have to go to a smarter, not a dumber, production system, which in turn requires smarter, not dumber people.

The question is how to do that, and it's extremely difficult. It's difficult because in the old system, because it was low-skill, work was essentially interchangeable. If we got laid off, or we fell ill, they could replace us in five minutes because they didn't have to teach anybody anything.

Now, of course, the high skill levels require that you either get people that have the skills, or there's an investment of time in teaching. Not only mechanical skills, but teaching culture, in the sense of learning how to get along with the other members of that team. You're no longer a machine, you're a person.

HT: You can't take a manager out of a foundry that operates the way it did in 1940 or 1950 and put him into a high-tech company in Silicon Valley.

AT: It's not just the workers, it's the managers too.

The basic change is we're moving from interchangeable labor. As the Industrial Revolution gave rise to interchangeable parts and interchangeable labor, we're now moving to noninterchangeable parts because they can be custom-made and individualized as the job requires, and to noninterchangeable people.

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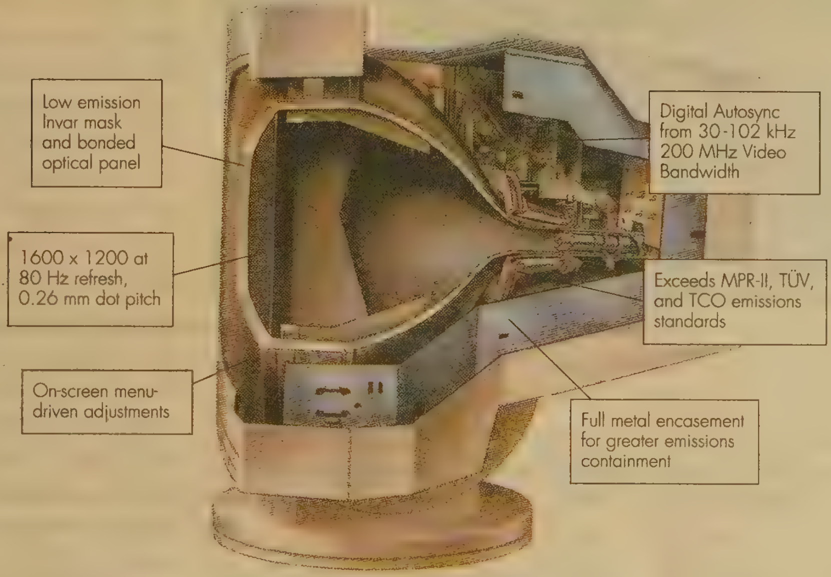
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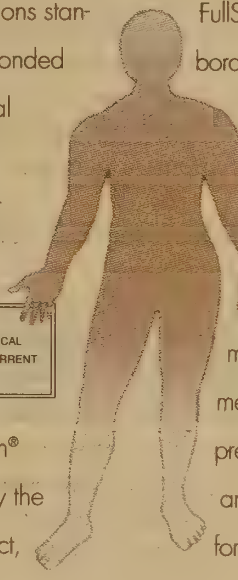

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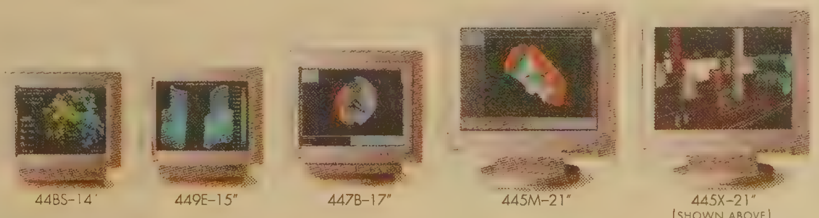
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Alvin Toffler:

"Corporate America is, on the one hand, driven by the recession to lay off people. But it is also restructuring, so that they're not going to put those people back on. Work is taking place in smaller groups, and the same thing is true in the military. Fighting is taking place, or will be taking place, in smaller groups."

That has a phenomenal effect on economics and social life, in the sense that in the old system, if you had X numbers of workers unemployed, you could stimulate the economy, create X number of jobs, and you'd solve your unemployment problem. Today you could have X number of people unemployed, you could create 5X jobs, but those workers could not do the jobs. Which means that the unemployment problem is directly related to skill requirements, and is much more complex than where you have interchangeable labor. It is also doubly difficult because of the rate of change—the skill requirements are changing constantly. So that even if you train people for a job, by the time they're trained the skill requirements may have changed again.

So that creates a truly intractable problem of unemployment that's not going to go away.

HT: But most of the unemployment is among the people who sell muscle power. People who worked in the construction industries, and there's very little construction going on. People who worked in auto factories.

AT: Second-wave work is drying up. That creates a monumental social problem for us, and I don't think that even this administration, which talks a lot about it, understands how profound this crisis is.

HT: And neither does the AFL-CIO.

AT: Well, it depends on which union, because some of them are organizing knowledge workers. But the old mainstream unions.

HT: I'm disappointed in the CWA. They give lip service to understanding, but I don't believe they really do.

The unions tend to be violently opposed to telecommuting, for instance.

AT: Yes! The unions see that as an attack, whereas it may be liberating for many workers.

Both management and the unions just seem to be interested in imposing this hierarchical adversarial boilerplate on people and making them conform to it rather than giving work a more human structure.

AT: Exactly.

So this is what we've been writing about for our lives, basically, and what is sad for us is to know that we, and others as well, have written some of this stuff twenty-five and thirty years ago, but America wasn't prepared to do anything about it.

HT: I don't think it was as clear then—it wasn't as clear then that it was really happening. Then, when we published *The Third Wave* in 1980, the *New York Times* blasted us and said that the idea of people working at home was ridiculous.

AT: "The Tofflers are visionary."

HT: "Ridiculous. People would never work at home." They asked the question, "Why would anybody want to work at home?"

AT: [*laughs*] And one of the great joys of the last few months was to see an article in the *New York Times*, in the same position as that first article I described, on page one, saying, "Guess what? People are working at home!" [*laughter*]

HT: Reporting on this as if they had always known that this was the case!

Tell us the story of your run-in with Don Regan...

HT: That was a White House lunch. We were invited to have lunch with President Reagan, then-Vice President Bush, I think Meese was at that lunch, and it was Regan's first day in the White House as chief of staff. And of course he was invited to the lunch also. I think there were eight futurists and eight White House people.

It was in the family dining room in the White House, and it was just an open discussion. The president was asking us questions.

AT: I opened by saying that futurists don't all see the world in the same way...

HT: And we don't. We disagree violently.

AT: But we all agree that something very big is happening, and it's not just more of the same. And Regan jumped in...

HT: After Al gave the introduction and said we don't all agree, Regan jumped up. "Aaah, you futurists," he said, "you all think we're going to run around cutting each other's hair and flipping each other's hamburgers. It's going to be a service society," he said, "and America's not going to be a great manufacturing nation anymore."

The men are all talking, but they're not addressing his question, and I sat there for about ten minutes waiting for one of these men to answer him, and they didn't. And it's very difficult when you're in a room with all these men to get a word in edgewise, because they don't pause long enough to take a breath for anybody to jump in. So after about ten minutes of waiting for somebody to answer him, and they're all talking from their egos and their own agendas...

AT: Most of us don't have *egos*.... [laughs]

HT: ... I couldn't stand it any more, and as soon as one of the gentlemen took a slight breath, I said, "I would like to answer your question, Mr. Regan. No, that's not what we're saying at all. We're not saying that America is not going to be a great manufacturing country. We certainly are. But we're going to have fewer people in the factories doing the manufacturing. We're going to have more automation. We're going to be more productive."

At that time, it must have been 1985, the example that was current then was the new Macintosh factory as opposed to the old Apple factory. They produced many more computers with fewer numbers of people in the factory. I had the figures.

AT: You were also talking about agriculture.

HT: I said, "Because we have less than 3% of our population in agriculture today, does that mean that we're not a great agricultural country?"

AT: In fact, the fewer people we had in agriculture, the larger the output has been. Why could that not similarly be the case with manufacturing?

HT: And I think I might as well have spoken to the wall. He never responded. And I don't think he understood the answer.

AT: Indeed, we wrote him afterwards and gave him some figures, for that and some other questions, and never got a reply from Don Regan. But Regan has not gone down in history as the nicest, most intelligent chief of staff we've ever had.

True. But suppose that somebody like him comes along now, and they're trying to get a clue but they're fixated on the wrong thing—how do you explain to such a person the difference between a knowledge worker and a burger-flipper?

HT: Hm...

The value-added component of a product used to be in the physical labor that went into it. The value-added component of a product today is the information.

AT: The problem is the manufacturers, the traditional second-wave blue-collar smokestack industries, have an ideology. An ideology is a self-justifying rationale. Their ideology, which they've managed to peddle to a great many intellectuals in this country and to a large part of the political establishment as well, is that manufacturing is the key to an economy, and that services are necessarily unproductive and a waste, basically.

Now, first of all, the tools we use to measure service and information productivity were designed to measure hardware, not software. We're lousy at measuring the productivity of services. So the answer is when we see statistics saying in the service sector group, productivity went down, they're meaningless, essentially. But they are useful as informational propaganda in defense of the old sectors.

HT: And in Marxist economics, the white-collar worker lived off the surplus of

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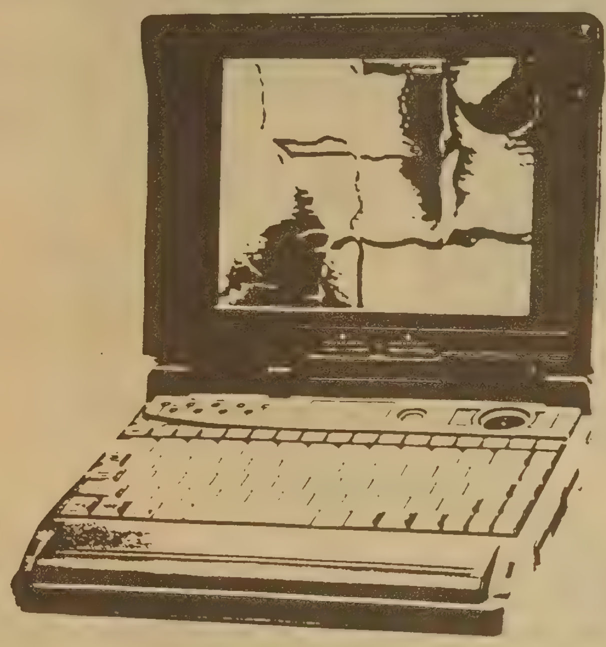

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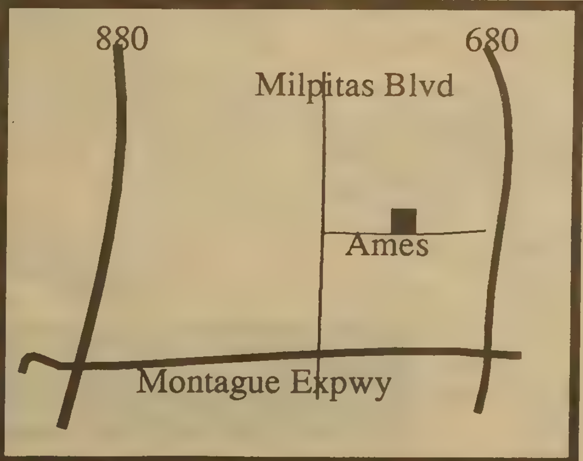

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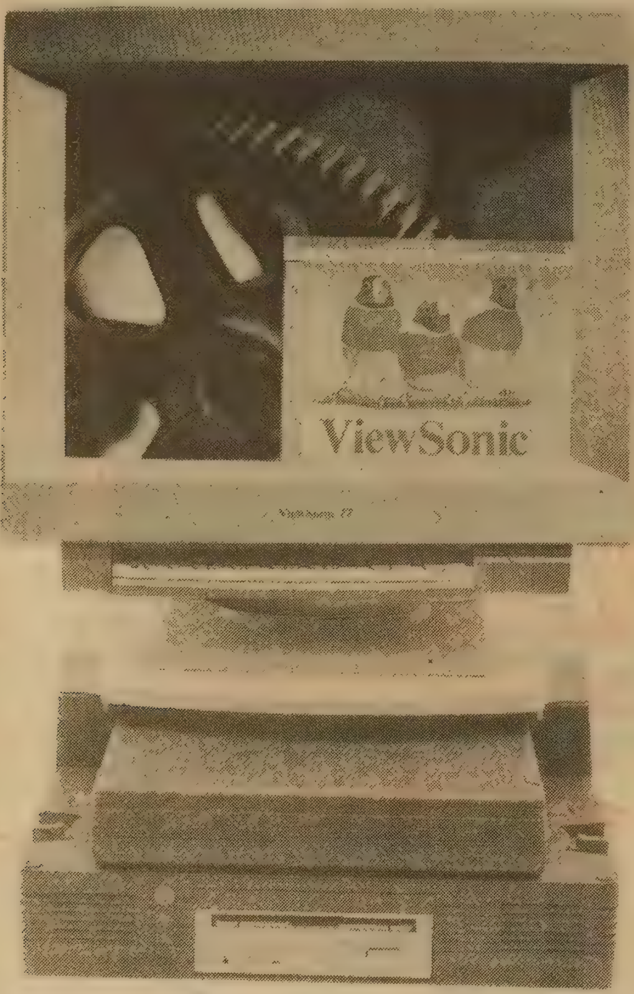

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the manufacturer—the manual worker.

AT: And that's basically not different from the classical capitalist economist, either. Classical economists also tended to look at mental labor as wasteful and nonproductive.

Different windows on the same thing.

AT: The knowledge worker is one who processes information data, ideas, symbols, images, and other forms of knowledge, as part of the task of creating wealth. This is done at many different levels of complexity, some very simple, some very complex, some more abstract, some less abstract. You can clearly see that an increasing number of jobs, both in manufacturing and in services (if that distinction still has any usefulness), are based on knowledge manipulation.

HT: Give the example of the seeds that caused a riot in India.

AT: I like that example to suggest the conflicts that are inherent in all of this. The process of moving from one form of production to another is not necessarily a peaceful process, so there are winners and there are losers in that process. And that's true, not just domestically.

In India, in July, there was a riot—angry farmers attacked an American agribusiness firm. Now, why did they do that? They said that the firm was selling them seeds at too high a price, considering the fact that that variety of seeds had originated in India in the first place. The company, of course, had taken the seeds and genetically enhanced them, which was, in fact, radically improving their productivity in India, by in effect injecting more information into those seeds.

But the information is invisible. It took millions of dollars of research and development to do that, but the Indian farmers cannot see that. They cannot see or touch the knowledge, the information. They can touch the high productivity, but that's not now, that's after the crop comes in.

So they in fact went on the rampage, even though it started out as a peaceful demonstration.

HT: Now the value added is the information.

AT: We believe that that is going to be true for almost all products. Information is being injected into hardware, and of course is the basis of software. So that we're truly going to an economic system in which knowledge, as we have argued, is the central resource.

In *Powershift* we made the point, as we've made repeatedly on other occasions, that the reason that knowledge is the central resource today is that with appropriate knowledge, we can reduce all the other resources needed.

HT: You can substitute knowledge for labor.

AT: Knowledge for labor, knowledge for energy, knowledge for space in the warehouse, knowledge for capital, knowledge for all the inputs of production. Knowledge can reduce the requirements. It therefore is what in *Powershift* we called the "ultimate substitute" for the other factors of production.

I'm kind of curious—take those smart workers back in the factory who weren't allowed to be smart. Does this do anything for them, or are they just getting crushed in a different machine than the one they were getting crushed in thirty years ago? Institutions mutate; what happens to people?

AT: Millions of people get caught in the crush. And one way of thinking about that is to look back at how the Industrial Revolution made its way onto the

> **Heidi Toffler:**
> "We're not saying that America is not going to be a great manufacturing country. We certainly are. But we're going to have fewer people in the factories doing the manufacturing. We're going to have more automation. We're going to be more productive."

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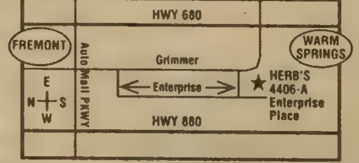

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stage of history. There was massive dislocation. There were wars and civil wars and unemployment and just horrible conditions for many, many people.

And yet, and yet—over the course of history, populations have migrated from the countryside to the slums of the city, because the slums of the city, as bad as they were, were better than the countryside. That's still happening all over the world. So the people who are attacking the terrible conditions today may be telling the truth, but it's not set in adequate historical perspective.

The reality is all those peasants who are pouring into Mexico City or into Bangkok or into wherever are not stupid. They're smart also. They're not educated, they're not economically skilled at high-productivity work, but they're not stupid, and they know that even digging garbage in Manila is better than living out in the countryside and starving to death like an animal.

HT: If those workers stayed in the auto plant doing the interchangeable jobs they're not better off. If they left the factory and—

AT: If they got some skills that were not outmoded by the time they got them—

That's a problem. I was talking to some teachers in a high-school job-training program recently, and they're trying to come to grips with the fact that any skill they teach those kids will be worthless in five years. So what do you do? What do you teach?

HT: You teach them to *think.*

AT: Yes. You have to teach meta-skills of some kind, and it's easy to say, but it's not so easy to do. You've got to teach skills about skills. And that is not something we know very much about doing. Nobody knows very much about doing that.

We think that it would be helpful for them to understand things like how to model. Because if I understand what a model is, I can model lots of things. Even if a model is inaccurate, it's better to have a model of a situation than to be confused by an assortment of unorganized, or random data. If a model is inadequate, you can fix it or replace it.

HT: I'd teach kids how to plug in and out of Internet. Or get into six hundred databases. How do you know that you're getting good medical care? By reading all the relevant papers that have been written. You can get access to them.

We have a friend who has a business. He's distilled vodka that is free of impurities.

AT: Give him a plug, honey! Tell her the name of the product! [*laughs*]

HT: Oh yes. SKYY vodka. It's sold here in San Francisco.

He was thinking of bottling it in small airline bottles, and he went to look at the machinery needed to do this.

AT: He said they wanted fifty or one hundred thousand dollars for the machinery, but as an engineer, he said, "I could make that for $15,000."

HT: He said, "You know, the patents are probably all expired."

He was talking to his assistant about this, and the assistant said, "Don't worry." He hooked up his computer, and in fifteen minutes he had a printout of all the relevant patents.

Our friend said, "In the past I'd have to go to a patent attorney, I'd have to pay for a patent search, and this kid had it for me in fifteen minutes."

That, to me, is an example of somebody who doesn't just have rote and repetitive computer skills. He thought about it. He thought about where the databases were. He accessed them, he got the information, he had it printed out...

He is invaluable to his employer.

AT: He made his boss very, very happy that day. And saved him loads of money. That translates into productivity, if you measure productivity the way economists do, to include alcohol as productive! [*laughs*]

One thing keeps occurring to me—what about filtration? As you get more and more information-dependent, you also have a much bigger garbage-in, garbage-out problem. The consequences of disinformation, or bad information, or propaganda are all the more serious.

HT: In *Future Shock* in 1970 we talked about information overload. I think if you're bombarded with too much information about anything, you get overloaded and you can't function.

We were at Fort Knox recently looking at the programmers working in the simulations for the M1A1 tanks, they were trying to create programs that took unnecessary data off the screen so the tank driver was not bombarded with all of this irrelevant information. It seems to me that's the job of metaprogrammers—how do you get the information that's relevant at the time?

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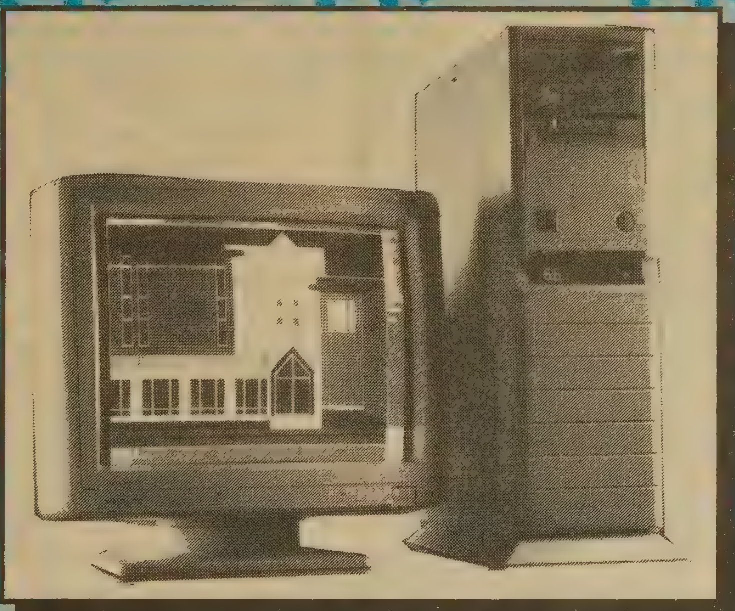

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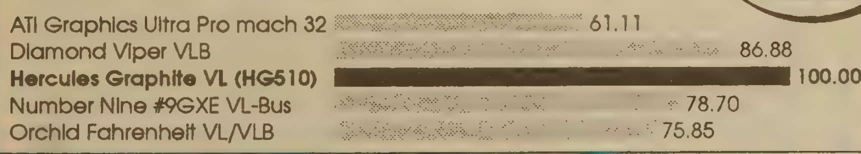

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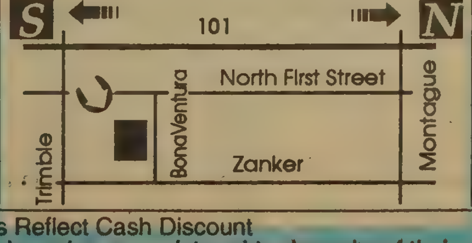

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> **Alvin Toffler:**
> "People on top are the last ones to find out what's going on, and that's why this whole discussion of 'empowerment' is not a result of altruism or New Age feelie stuff—it's that you can't make a profit, you can't make a product, the old way. You *have* to empower to a certain degree the people who are actually doing that work. Because now they're the ones who know, and they can tell you what you cannot tell them."

And how do you avoid being manipulated by somebody who's trying to feed you information to make you do what they want?

AT: You do that by understanding that all information is manipulated.

HT: But you as the operator still have the option of getting additional information.

AT: We're not only manipulated deliberately, but we're also victims of looking at a map and believing it is the same as the territory. Korzybski says no. Korzybski was the father of general semantics, and he had a slogan: "The map is not the territory." The map is not the territory.

HT: The word is not the thing.

AT: The word is not the thing. And I know that from personal experience.

As a correspondent in Washington—I spent a few years there—I remember coming home from a very complex set of congressional hearings. All day long, seven hours of detailed testimony about disarmament. And it had to do with throw weights and warheads and just really, really complicated stuff.

HT: And he had to boil all that down to five hundred words.

AT: And suddenly I had to write the story, which would appear on page one of my paper, and I had to do it by a certain hour. I wrote it, and I said, "You know, that doesn't really capture the complexity of what went on in that room."

So I wrote it again, and again, and again, and again, and again. I kept throwing the versions away trying to encapsulate the complex reality that occurred in that room, and finally the deadline was upon me, and that was the version that was going to get printed.

Now as I filed that story, it suddenly occurred to me that there were going to be nine other stories around it on page one, written by nine other journalists, some of whom might be more or less intelligent than I, more or less capable than I, more or less responsible.

And the consequence of that is that what we read is essentially a fiction. It may be the best fiction we can get. It's as close to the reality, perhaps, as we can make it, but it ain't the reality. So as far as information is concerned, we're also at the mercy of deliberate manipulators, and that's true of all politicians and all bureaucrats and so forth...

And all marketing departments...

AT: And all marketing departments.

HT: And all governments.

AT: All of that.

In *Powershift* there are two chapters of which I'm more proud than Heidi—they've never been favorites of hers, but I think they're quite useful. They outline the tactics that are used to manipulate information, whether you're talking about political systems or individual corporate bureaucracies and so forth.

You can disguise the sender—make believe it's coming from a different source than it really is coming from. You can disguise the message itself—you can tamper with the message itself. You can tamper with the communications. You can affect the receiver. You can withhold. You can route the memo to only these people and not those people. You can overload. You can send the budget in all in one gigantic document, as they do in Congress, so they can't have a chance to really understand it. Or you can dribble the information out so slowly they can't see the pattern. There are a million information tactics that are used every day of the week.

And now that it's digital, it's even easier! You can put flying saucers in that picture...

AT: Exactly! So the first of those chapters deals with conventional information tactics, and the second chapter in that series deals with what we call metatactics as a result of the arrival of the computer. So there you have many more options of how to manipulate.

HT: You can build models and put in some variables and leave out others.

AT: You could weight them differently.

You could get something purporting to be the objective facts which is carefully filtered to one point of view or another. My experience is that most people aren't even aware of what goes into this—"Oh, I saw it on TV so it must be true!"

HT: We have a friend who's an eminent psychopharmacologist and statistical mathematician, and he says, "Always look at the research design. And then look at the basic statistics. And if they don't make sense, don't just accept them."

AT: It struck me as interesting some years ago when Bush was still in—Sununu, who was a computernik, was chief of staff, and he got into a big battle with Gore over the model for global warming.

What was interesting to me was not the substance of their positions, but the fact that the argument took place over the adequacy of The model. That's pretty sophisticated. Sununu was arguing that we don't have enough points of information, enough data coming in, the model is inadequate, why should we base major social or economic policies on this? Gore's position was: the model is adequate, the information is adequate for us to do something.

Now that's a step removed from the argument over what you should do. That is a meta-battle going on.

It's an agenda-driven meta-battle.

AT: Of course! Everything's agenda-driven in Washington.

HT: The people in the White House who write the option papers boil this all down and give the President three options.

AT: High, low, medium.

It's like those multiple-choice tests where you want to check None of the Above.

AT: That's right. Drop the nuke, do nothing, or continue doing what you have been doing.

HT: There may be eighteen other options.

AT: And indeed the option writers lead the decision-maker by the hand. I've spent some time looking at options, potential options, as a literary form, and have looked at this and talked to the people doing this, in Tokyo, in Moscow, and in Washington.

And I discovered, for example, in Washington, that you can say, "Here's a problem, Mr. President. Here are three options. Tick one off." Or you can say, much more cleverly, "Here is a problem, Mr. President. Here is what you've said about it before. Here are several options. Choose one." [*laughs*]

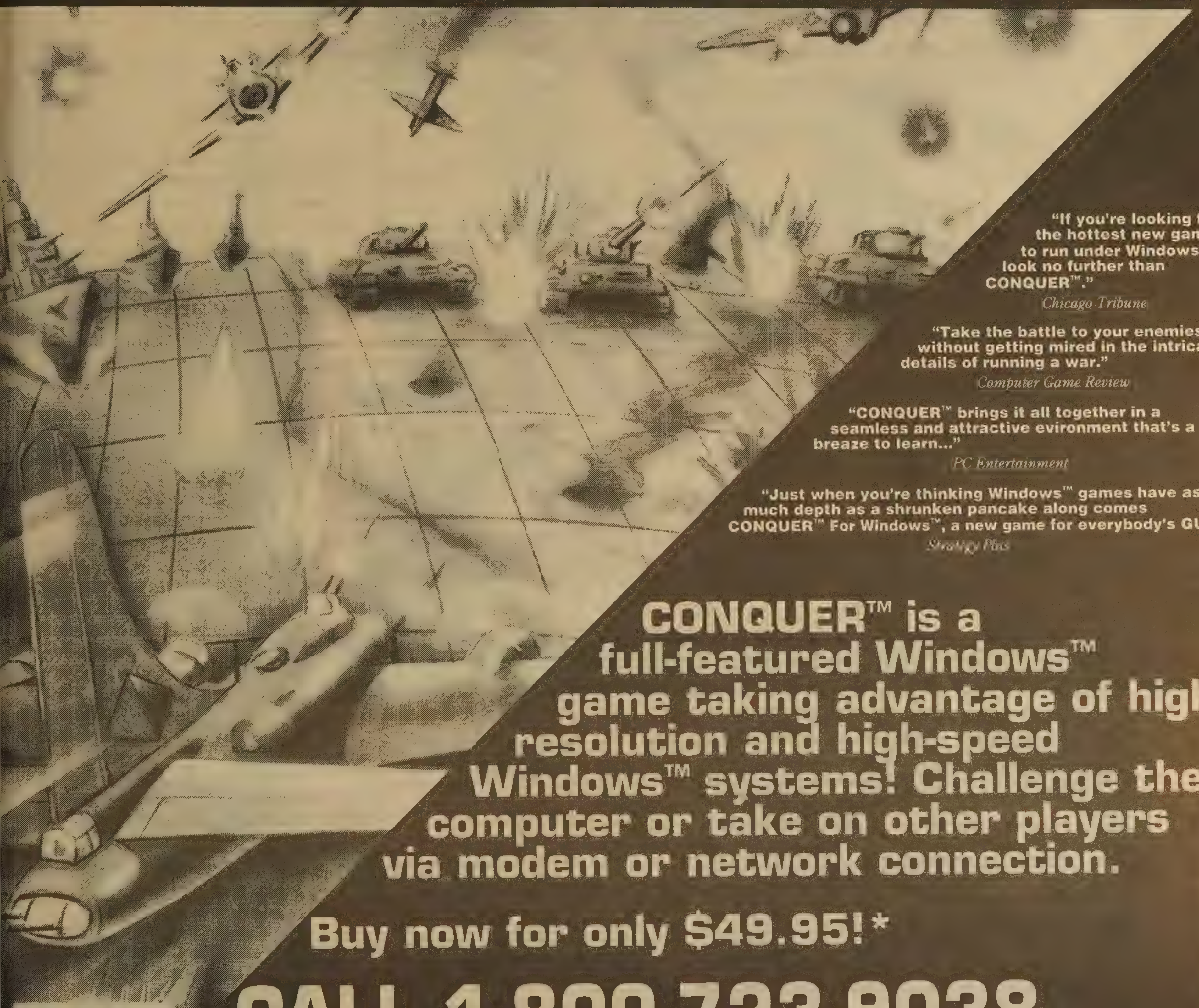
So all information emanating from any large institution is regarded by the people in the institution as essentially ammunition. Words are info-bullets. All agenda-driven. Sometimes the people are not even aware of their agenda, but that's a different story. That's another level of complexity.

HT: I think you have to assume that you're being manipulated. But it's good to ask the question of how are you being manipulated, and by whom.

And why.

AT: You may want to lend yourself to some manipulations, because you may agree with the agenda.

I'm sure we've been used unbeknownst to us in defense of all kinds of things that we would not necessarily agree with. And if we are, you can be sure that you are and everybody else is. ■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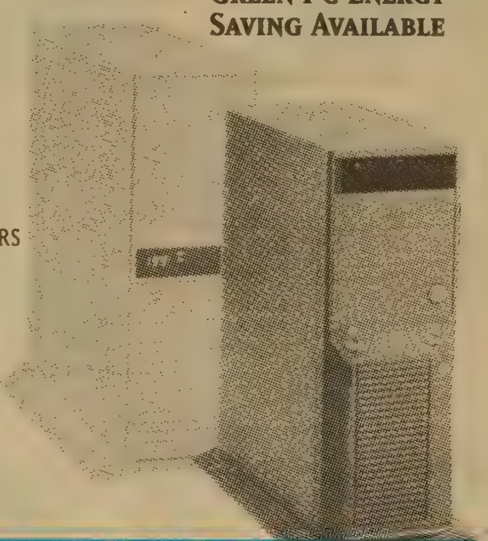

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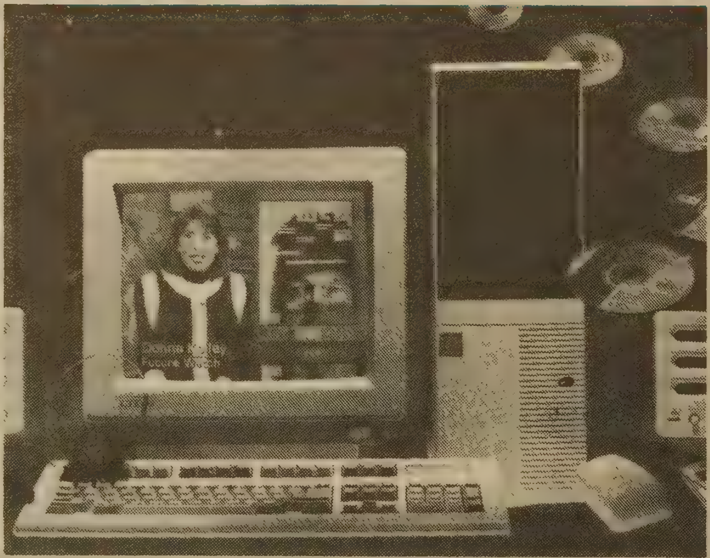

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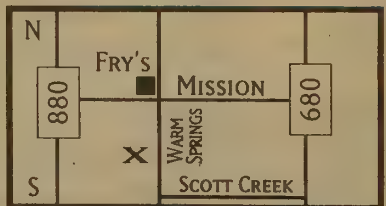

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INDUSTRY LEADERS, LUMINARIES, AND UNSUNG HEROES OF 1993

Interval Research head David Liddle, who years ago at Xerox PARC helped create technology that went on to enable the personal computer revolution, has been heard to remark of late that in the not-too-distant future, the computer is going to disappear. It's not that we won't be using them; it's just that the machines and applications will be essentially transparent, and the important thing will be what you can do with them—play, work, learn, and interact in ways we're only beginning to imagine.

This year's list reflects an industry moving in that direction. Hardware and applications are rapidly becoming commodity products, though ever-faster and more feature-laden ones. The growth is in the information, from corporate data to networked games to movies-on-demand, that's being created and consumed by their users. Consequently you'll see a lot of people from the multimedia world, both tools and content providers. You'll see a large number of people from the networking world as global highway construction increases at a nearly incomprehensible rate. You'll find quite a few who wrote books to help people visualize and make sense of it all. And, as always, you'll encounter a few virtually unknown souls who just went out and did something good.

We hope you enjoy this year's list, and that you're not shy about telling us who should be on next year's.

SHELDON ADELSON
CHAIRMAN AND CEO
THE INTERFACE GROUP

The entire computer world comes to COMDEX to announce products, check out what's new, and schmooze with its peers, and Adelson keeps giving it more and better COMDEXes, embarking on further global efforts with shows in Europe and the Far East.

Regrettably, he hasn't found the solution for COMDEX-related gridlock in Vegas, however.

PAUL ALLEN
CHAIRMAN

DAVID LIDDLE
PRESIDENT AND CEO
INTERVAL RESEARCH CORPORATION

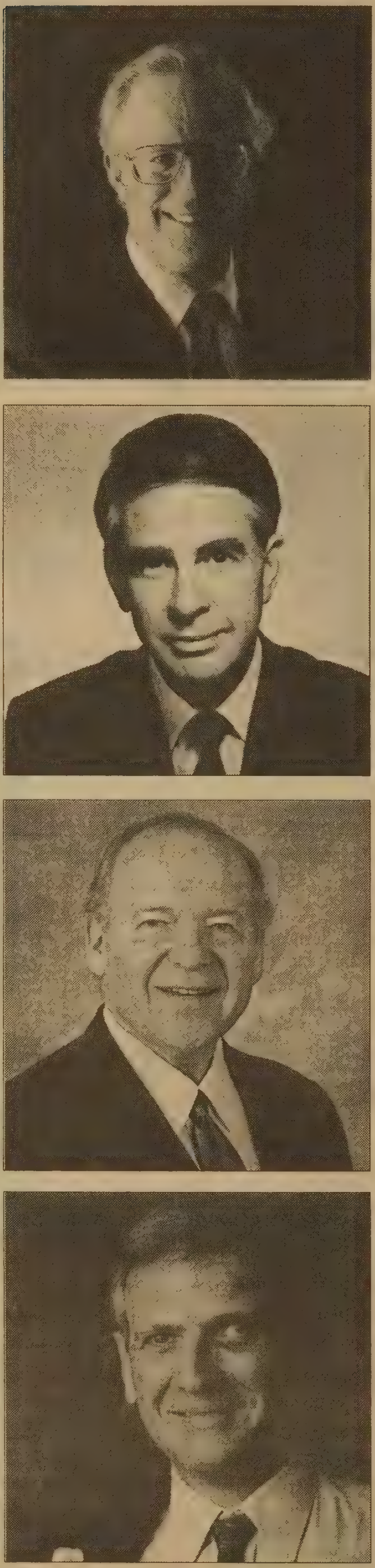
Xerox PARC pioneer Liddle and Microsoft cofounder Allen started Interval in 1992 to perform research and advanced development on information systems, communications, and computer science. As Allen said at the time, "We share the view that the larger potential of computing is not being realized, and the major problems to be solved require a more exploratory approach than can be taken when developing competitive products for an existing market."

In the interim they've kept a tight lid on information emanating from Interval, while attracting some stellar personnel. Toward the end of 1993, Liddle, while still pretty reticent about the actual projects going on, has spoken about the company's overall vision of computing in the next century—a key component of which is that the "computer" itself will essentially disappear and will become a transparent tool for letting people interact with information, their surroundings, and each other.

ROBERT ALLEN
CHAIRMAN AND CEO

ROBERT KAVNER
EXECUTIVE VICE PRESIDENT; CEO, MULTIMEDIA PRODUCTS AND SERVICES GROUP
AT&T

There was a time in the recent past when AT&T was regarded as a stodgy corporation lagging behind the times, but Allen and Kavner are aggressively moving the company into technological areas far beyond Plain Old Telephone Service. With strategic deals such as 1993's acquisition of McCaw Cellular and EO, and divergent investments such as General Magic (whose TeleScript offers unprecedented simplicity in moving diverse content over the phone or wireless networks), entertainment innovators 3DO and Spectrum HoloByte, and the Sierra Online gaming network, they've positioned AT&T as a leading architect of digital highways and provider of some of their more interesting destinations.



Top to bottom: Alan Ashton, Robert Allen, Sheldon Adelson, Enzo Torresi.

CARLTON AMDAHL
CHAIRMAN AND CHIEF TECHNICAL OFFICER

ENZO TORRESI
PRESIDENT AND CEO
NETFRAME

Torresi and Amdahl cofounded NetFRAME a few years ago to develop and market Amdahl's innovative and sophisticated network server technology. Today the company's "superservers," which combine several Intel CPUs and offer performance that compares favorably with minis and mainframes, are finding wide acceptance with customers that include Alcoa, Shell Oil, Microsoft, Citibank, and the US Holocaust Memorial Museum, in applications from single-location to geographically widespread networks.

ALAN ASHTON
PRESIDENT AND CEO
WORDPERFECT

For many CEOs, a crucial issue in an evolving industry is adapting to the times. In recent years, WordPerfect has often been cited as a company at risk because of its apparently complacent dependence on its flagship product, the industry-standard WordPerfect word processor, and a general slowness to adapt to industry trends.

In response to changing markets, founder Ashton has led the company through a remarkable period of self-reinvention, with a new emphasis on strategic alliances and cooperation with other vendors, including Novell and IBM. WordPerfect Office, the company's integrated email and scheduling package, is gaining market share over its competitors from Lotus and Microsoft, and is making inroads in the mobile computing arena thanks to agreements with such vendors as Motorola and RAM Mobile Data.

The word processor's still doing fine, though. WP 6.0 for Windows recently won PC/Computing's MVP Award, and the DOS version is at the top of the charts.

What's next? Well, the company recently launched a consumer software line and is looking into edutainment...

JOHN PERRY BARLOW

MITCH KAPOR
COFOUNDERS
ELECTRONIC FRONTIER FOUNDATION

Occasionally dubbed "the Odd Couple of Cyberspace," Kapor and Barlow have created some strong alliances in the quest to implement what Kapor calls a Jeffersonian vision of the info infrastructure—one in which individuals are info-producers as well as info-controllers, where the owners of the highway provide access to all prospective travelers. They've also been instrumental in forming a strong consortium to inform the government

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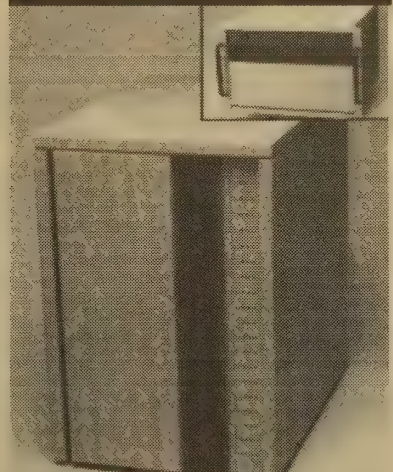

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of the communication industry's need for strong data privacy protection, and with their various writings and presentations they've kept an extremely diverse audience aware of the evolving issues relating to digital civil liberties.

CAROL BARTZ
PRESIDENT, CEO, AND CHAIRMAN
AUTODESK

Since coming to Autodesk from Sun in 1992, Bartz has provided strong, effective leadership for the world's sixth-largest software company, increasing the company's profitability and maintaining a steady stream of product releases and updates, including an excellent Macintosh version of AutoCAD and an exceptionally well received version of 3D Studio. She also provided input on the Clinton administration's technology policy, speaking at then-President-Elect Clinton's Economic Summit in Little Rock.

She did a good deal of this while waging a successful fight against breast cancer, and now serves on the board of the National Breast Cancer Research Foundation and speaks frequently on women's health issues.

ERIC BENHAMOU
PRESIDENT AND CEO
3COM

Taking 3Com considerably beyond its Ethernet origins, Benhamou has not only achieved stellar success in the booming LAN market but made the company a world leader in complex global network systems. He's pleased customers and shareholders alike with leading-edge technologies, custom solutions, and ever-increasing sales and profits.

DANIEL BEN-HORIN
DIRECTOR
COMPUMENTOR

Continuing to match computer-skilled volunteers with nonprofits in need, Ben-Horin's expanded the scope of CompuMentor to specialized training in Internet access for community organizations. He's also looking at ways of bringing computer training into cash-strapped and under-resourced local schools, and generally discovering new and useful ways for the computer industry to make a positive difference in the surrounding community.

JIM BIDZOS
PRESIDENT
RSA DATA SECURITY

Encryption technology was a hot topic in 1993 as individuals became worried about protecting their private information, software companies their intellectual property, and businesses their trade secrets in an increasingly vulnerable world of electronic communications. Bidzos, whose company markets superior encryption technology based on the RSA algorithm and the public-key principle, has been a tireless speaker on the conference circuit during 1993, increasing awareness of the technical and business aspects of the privacy issue. He's also been highly successful at winning acceptance for RSA technology in other vendors' products—it's been a key component of Lotus Notes from the beginning, for instance, and was incorporated in Apple's System 7 Pro.

Asked recently about whether the government-proposed Clipper standard, announced last spring to general derision from the technical community, posed a threat to RSA's business, Bidzos appeared to regard the scheme as essentially a dead issue, pointing out that with over two million copies of RSA out there in the world, its users were unlikely to sit still for an expensive switch to a more vulnerable technology.

STEVEN BLANK
PRESIDENT AND CEO
ROCKET SCIENCE

While SuperMac veteran Blank's startup is some distance away from shipping its first product, that didn't stop it from garnering headlines in 1993 as one of the most interesting attempts to bridge the gap between the computer and entertainment industries. Launched in July, the company has scored technical coups like recruiting most of Apple's core QuickTime team and key animators from Industrial Light and Magic, not to mention luring writers and artists responsible for such blockbusters as *Jurassic Park*, *Terminator II*, and *The Hunt for Red October*.

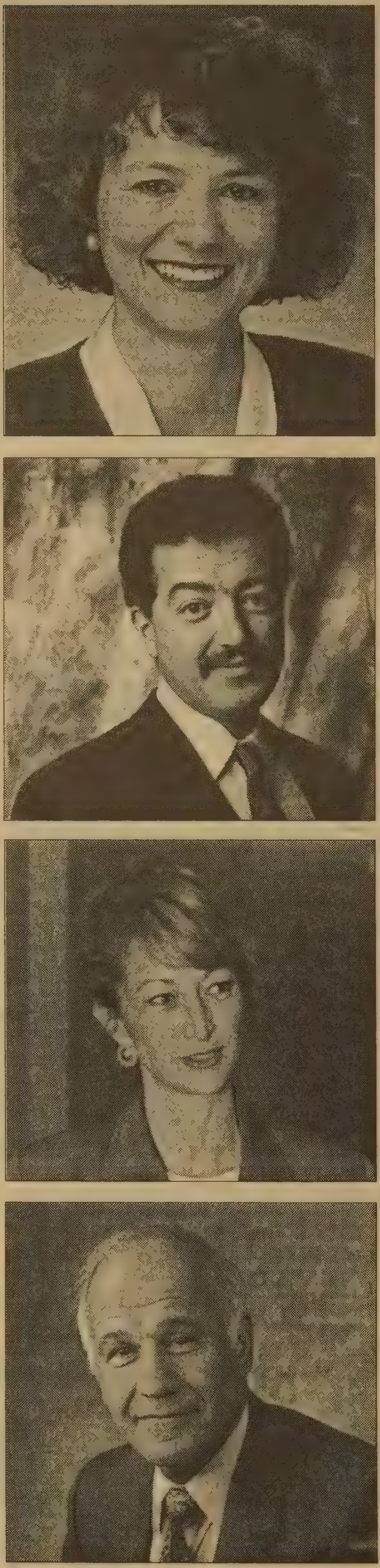
The company has announced that its first interactive entertainment releases will ship on CD-ROM. However, Blank remarked recently, the company's long-term future is based on the scenario of its products going direct to the user via the emerging plethora of set-top cable boxes.

BMUG

Expanding ever further into cyberspace with its Planet BMUG BBS, the intrepid BMUGers continued to broaden their horizons across platforms, across nets, across continents. In addition to assisting hordes of users with technical support issues and providing tons of software, the BMUGers entertained the industry with their unique trade show presence and their genial rivalry with the Boston Computer Society.

DEBRA BOWEN
CALIFORNIA STATE ASSEMBLY MEMBER
AUTHOR, AB1624

Bowen performed a great public service to the citizens of California and struck a major blow for government accountability with this bill, now law, which mandates that all proposed bills in the California legislature be made available to the public in digital form. As the business world is using



Top to bottom: Carol Bartz, Eric Benhamou, Debra Bowen, Sheldon Breiner.

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- Available in 25 pin or 36 pin styles
- Fully shielded, all metal construction
- 5 Year warranty
- 2 - 5 position models
- All pins wired through

Ordering Information
25 Pin (DB25F) switches

Part #	Description	Price
25AB2	2 In - 1 Out	$14.95
25AB3	3 In - 1 Out	$19.95
25AB4	4 In - 1 Out	$24.95
25AB5	5 In - 1 Out	$29.95

Ordering Information
36 Pin (Centronics) switches

Part #	Description	Price
36AB2	2 In - 1 Out	$19.95
36AB3	3 In - 1 Out	$24.95
36AB4	4 In - 1 Out	$29.95
36AB5	5 In - 1 Out	$34.95

Low cost elect. printer sharing

Print-Share for sharing 1 or 2 Printers

Features and Benefits:

- Low cost
- Simple to use
- Automatic operation
- No waiting to print!
- No software drivers
- Cables included! (2-10 foot & 2-25 foot)

Ordering Information

Print-Share comes complete with cables, power unit, & user manual. Models differ only in the amount of buffer memory installed.

Model	Buffer	Price	Sale Price
PS-1	64K	~~$299.00~~	$199.00
PS-2	256K	~~$349.00~~	$249.00
PS-3	1 Meg.	~~$399.00~~	$299.00

Mid range buffered printer sharing

Print-Share^{XL} for sharing 1 to 4 Printers & up to 7 computers

Features and Benefits

- Low cost
- No training required
- No waiting to print!
- Automatic operation
- No software drivers
- Large buffer memory
- Cables included!

Print-Share^{XL} is available in 3 models. All models come complete with cables, power unit, & manual. Models differ only in the amount of buffer memory installed.

Model	Buffer size	Price	*ON SALE*
XL-1	256K	~~$399.00~~	$299.00
XL-2	1 Meg.	~~$449.00~~	$349.00
XL-3	4 Meg.	~~$599.00~~	$499.00

Printer / plotter sharing

Easy-Share

Features and Benefits:

Supports any combination of serial or parallel ports.

Any port connects to any serial or parallel device.

Simple to use. (no training required)

Automatic operation. (no operator controls)

Guaranteed Compatibility. (No software drivers)

Large buffer memory. (up to 4 Megabytes)

You save time! (by not having to wait to print.)

Expandable! (Chain units for up to 56 devices)

Ordering information

Model	Ports (#Ser/#Par)	Price
ES-4	8/0	$595
ES-9	7/1	$595
ES-6	6/2	$595
ES-8	5/3	$595
ES-5	4/4	$595
EP-8	3/5	$595
EP-6	2/6	$595
EP-9	1/7	$595
EP-4	0/8	$595
Extra buffer memory		
256K		$25
1 Megabyte		$50

Parallel Cables

Features and Benefits:

- Available in Male-Male or Male-Female
- All 25 wires connected straight through
- Lifetime warranty
- Fully shielded

Ordering Information

Part#	Description	-6 (6 foot)	-10 (10 foot)	-15 (15 foot)	-25(25 foot)
CP-x-XT	DB25 Male to DB25 Male	$5.95	$8.95	$10.95	$24.95
CP-x-MF	DB25 Male to DB25 Female	$5.95	$8.95	$10.95	$24.95
CP-x-36P	DB25 Male to 36 Pin Centronics ——	$8.95	$12.95	——	

Tanstaafl offers a complete line of both serial and parallel cables. If you don't see it here or need special length cables call our order desk for assistance.

Fast-Link / LPT Link

Parallel cable extender / Par. to ser. converter

Fast-Link Features & Benefits:

- Reach distant parallel printers.
- High speed data transfer. (up to 16 X faster than serial cables)
- Arrange *your* office *your* way.
- Move noisy printers to another room.
- "Plug and Print operation". (No switches, no software, just plug it in and print.)

LPT-Link Features:

- Solve port mismatch problems
- Transparent operation
- Low Cost

Ordering information

Fast-Link	Length	Price
FL-050	50'	$129
FL-100	100'	$149
FL-150	150'	$169

Lpt-Link	Length	Price
LPT-0	No cable	$59.95
LPT-50	50'	$69.95
LPT-100	100'	$89.95

Longer cables are available for $20 each additional 50'

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technology to operate more efficiently and eliminate layers of bureaucracy, Bowen's bill permits citizens more direct and hassle-free involvement in the doings of their elected representatives.

Sheldon Breiner
President
Quorum Software Systems

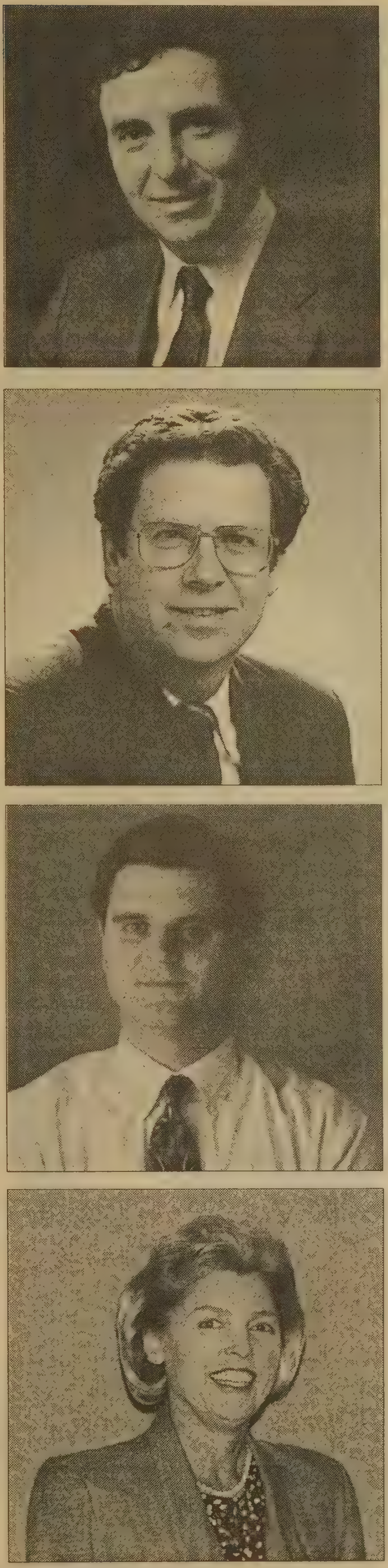
Breiner and his fledgling company have weathered a few legal salvos from Apple and found wide acceptance in the workstation world for their software products: Quorum Equal, a user-level program that allows the use of Macintosh programs in native format on various workstations, and Quorum Latitude, which allows developers to quickly port their Mac applications to the UNIX environment. In 1993, Equal began shipping Word and Excel on its CD-ROM under a licensing agreement with Microsoft, which had historically cited the fragmentary nature of the UNIX marketplace as a reason not to port its applications; it also astonished observers accustomed to the performance hit of emulators by running a Quadra-level speed on SGI's Indy. Latitude was also a key component as Mac application developers moved their software into the workstation world; Adobe announced that it was using Latitude to port Photoshop to the Sun and Silicon Graphics environments.

David Brown
Chairman/Acting CEO
Visioneer

Providing a sterling proof that major productivity enhancers don't have to be huge and expensive, Brown's little Menlo Park startup markets a novel hardware-software package called PaperMax. Realizing that businesses often need to share documents over the network or the phone lines, and that 95% of the documents they need to share are on paper, they combine their Mac and Windows software (including free and widely distributed reader software) with a compact desktop scanner which instantaneously puts a paper document on the screen in PaperMax form, for sharing, markup, faxing, storage, etc. A simple idea that stands to make life easier for a lot of people.

Jim Cannavino
Senior Vice President, Strategy & Development
IBM

While IBM as a whole isn't necessarily out of the woods in its perilous transition from unwieldy monolith to a lean, mean, just-in-time organization, Cannavino has achieved a remarkable turnaround with the IBM PC company, which has garnered critical acclaim and record-breaking sales with products from the state-of-the-art ThinkPads to the affordable ValuePoints. With the PowerPC waiting in the wings and OS/2 getting ever-better market share, the future's looking bright for this part of the Blue empire.


Top to bottom: Jim Cannavino, Doug Carlston, Steve Case, Barbara Cass.

Doug Carlston
Chairman and CEO
Brøderbund Software

A rare long-term success story in the consumer software business, Carlston has kept the company interesting and its products attuned to users' changing sense of the neat and useful. Brøderbund entered the CD-ROM game world in 1993 with the much-acclaimed Myst, introduced new and updated products from preschool to Print Shop, and kept the wily Carmen Sandiego one step ahead of the law for further adventures.

Denise Caruso
Editor
Digital Media

One of the leading analysts in the multimedia field, Caruso studies the converging players and technologies for the benefit of readers trying to achieve commercial success in a perilous industry. For those attempting to figure out where it's all going, Caruso's articles provide an invaluable road map and survival kit through the hype.

Steve Case
President and CEO
America Online

In contrast to most of his competitors over the last year, Case actually lowered access charges on AOL. He also hit the road with a traveling AOL team that hosted parties for members in Hard Rock Cafes all across the country, and generally engaged in aggressive and successful recruitment of new members. To say nothing of new platforms, as AOL moved into the PDA arena on the Zoomer, Sharp, and Newton.

All of which seemed at year's end to have the system hardware somewhat bogged down by the hordes of users, something that seems to be an ongoing problem with successful systems.

Barbara Cass
Executive Director
Software Entrepreneurs Forum

Offering unparalleled support, information, and professional networking opportunities for new and experienced software developers, SEF is one of the industry's most vital resources. It celebrated its tenth year of service to the development community in 1993, a testimonial not only to the Valley's entrepreneurial spirit but to Cass's ability to keep an increasingly complex organization healthy and growing.

Casey Cass
CEO and Founder
Tital Systems Inc.

Cass's enthusiastic employees brought him to our attention, citing the success of the company he started with $500 in an unfurnished apartment in San Francisco three years ago. Believing that computer buyers were faced with a hopeless task in dealing with retail sales personnel who often knew nothing about the products they were selling, Cass set out to run his business differently. Among the service-oriented policies at Tital (which has now expanded to an all-in-one retail, training, and manufacturing facility that employs thirty-six people): every employee will receive a minimum of one hour's product and service training per day; employees receive training from manufacturers' representatives at least once a week; no voicemail during business hours; customer calls requiring research will be returned within thirty minutes. We are pleased to join with Cass's employees in saluting these exemplary policies and achievements.

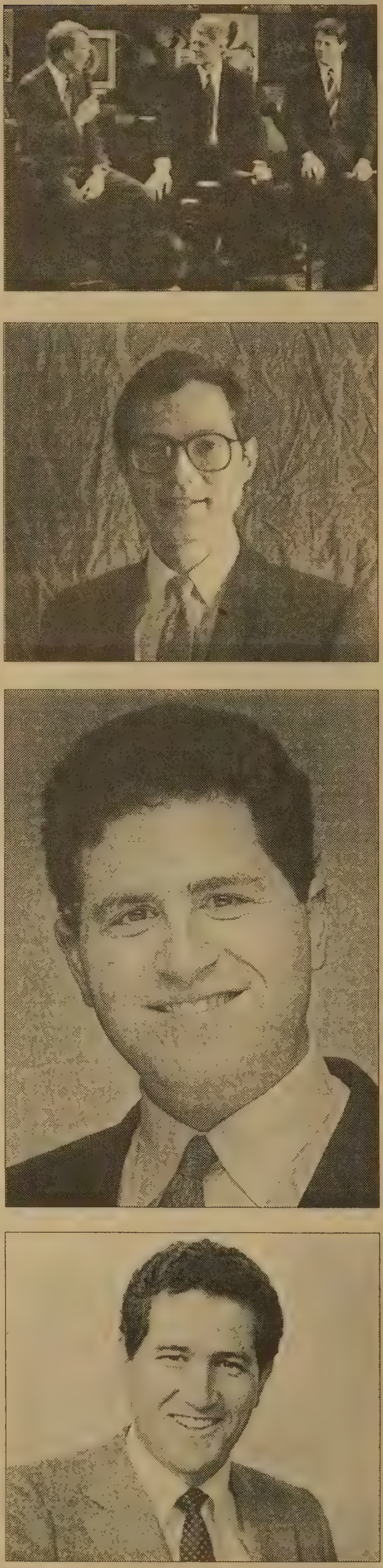
RONALD CHWANG
PRESIDENT
ACER AMERICA
Strategies like just-in-time manufacturing and a diverse distribution channel from VARs to catalogs have helped Chwang keep Acer growing at far greater than the industry norm in recent months. Acer America accounts for about a fourth of the Taiwanese parent company's revenues and manufactures nearly all its products locally for best response to the changing marketplace. While the majority of the company's business is based on the well-entrenched Intel standard, the company is also exploring other platforms, experimenting with MIPS-based parallel-processing machines to take advantage of the emerging Windows NT server market.

JIM CLARK
CHAIRMAN

ED MCCRACKEN
PRESIDENT AND CEO
SILICON GRAPHICS
Clark and McCracken seemed to be generating news on an ongoing basis all year—hosting the Clinton/Gore road show, forming alliances with cable companies for set-top box design and video-to-the-home projects, shipping more powerful hardware at the high end and the revolutionary Indy at the low. Wherever the digital highway winds up taking us, Silicon Graphics is getting heavily into the transportation business.

BILL CLINTON
PRESIDENT

AL GORE
VICE PRESIDENT
UNITED STATES OF AMERICA
Whatever you might think of these guys on the political front, there is no doubt that they are far more aware of the importance of technology than any of their predecessors. They played a major role in making the Internet a household word, and made the White House accessible via email for the first time in history. Many industry leaders have pinned their hopes for the future to this administration; others warn of dire perils. Time will tell, but an administration committed to building an information highway is certainly a step in the right direction.



Top to bottom: (l–r) Ed McCracken, Bill Clinton, Al Gore; Scott Cook; Michael Dell; Brian Dougherty.

SCOTT COOK
CHAIRMAN, PRESIDENT, AND CEO
INTUIT
Cook further strengthened his company's eminence in money management, both in the business and personal finance areas. His flagship product Quicken continues to gain market share as consumer computing grows explosively and the software gets more features, and a Pocket version for the Tandy/Casio Zoomer came out to help the mobile professional track finances on the go.

JAN DAVIDSON
PRESIDENT AND FOUNDER

ROBERT DAVIDSON
CHAIRMAN AND CEO
DAVIDSON AND ASSOCIATES
Founded by Jan Davidson in 1982 to market some speed-reading software she'd created, Davidson and Associates went public in 1993 and expanded its leadership role in the fast-growing education marketplace. The Davidsons play complementary roles in the company, Jan in charge of the technical side and Robert of the business aspects.

In addition to the shipment of such hit packages as Kid CAD and Math Blaster: The Search for Spot, 1993 saw such milestones as strategic alliances with textbook vendors for multimedia curriculum development and the company's selection as one of the "best small companies in the world" by *Forbes*.

MICHAEL DELL
CHAIRMAN AND CEO
DELL COMPUTER
While somewhat scathed from his brasher attempts to do battle with Compaq, Dell has remained a major force in the industry, keeping his company on a fast growth track. He was among the pioneers of innovative service and support programs for customers who range from large corporate accounts to individuals and small business, and of making his products available to customers through their channels of choice. As Dell's annual report states, the company is committed to a strategy of "mass-produced technology, one customer at a time," and its founder has been generally successful at adapting to changes in the business that have undone many of his rivals.

BRIAN DOUGHERTY
CHAIRMAN AND CEO
GEOWORKS
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- 3 button Hi-Res. serial mouse
- FREE software option

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- Energy efficient system & monitor
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- Mini-Tower case w/200W Green PS
- 101 Key enhanced keyboard
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- 3 button Hi-Res. mouse
- FREE software option

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- 256K Cache (Max: 512KB)
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- Intel Saturn 82420 PCI Chipset
- 5-16 Bit AT slots, 3-32 Bit PCI Local Bus slots
- Built-in PCI based SCSI interface
- 2 serial, 1 parallel & 1 game port
- 1.44MB floppy drive
- 340MB SCSI hard drive
- 32-Bit PCI Local Bus S3 Windows accelerator card (24 Bit true color 1280x1024 display)
- 15" SVGA non-interlaced flat screen monitor .28 dp
- Mid-Tower case w/250W PS
- 101 Key enhanced keyboard
- Microsoft serial mouse
- FREE software option

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- 2 serial, 1 parallel & 1 game port
- w32i VLB/2MB video card
- Mid-Tower case w/250W PS
- 15" SVGA non-interlaced flat screen monitor .28 dp
- 101-Keytronic keyboard
- Microsoft serial mouse
- MS-DOS & MS Windows 3.1
- FREE software option

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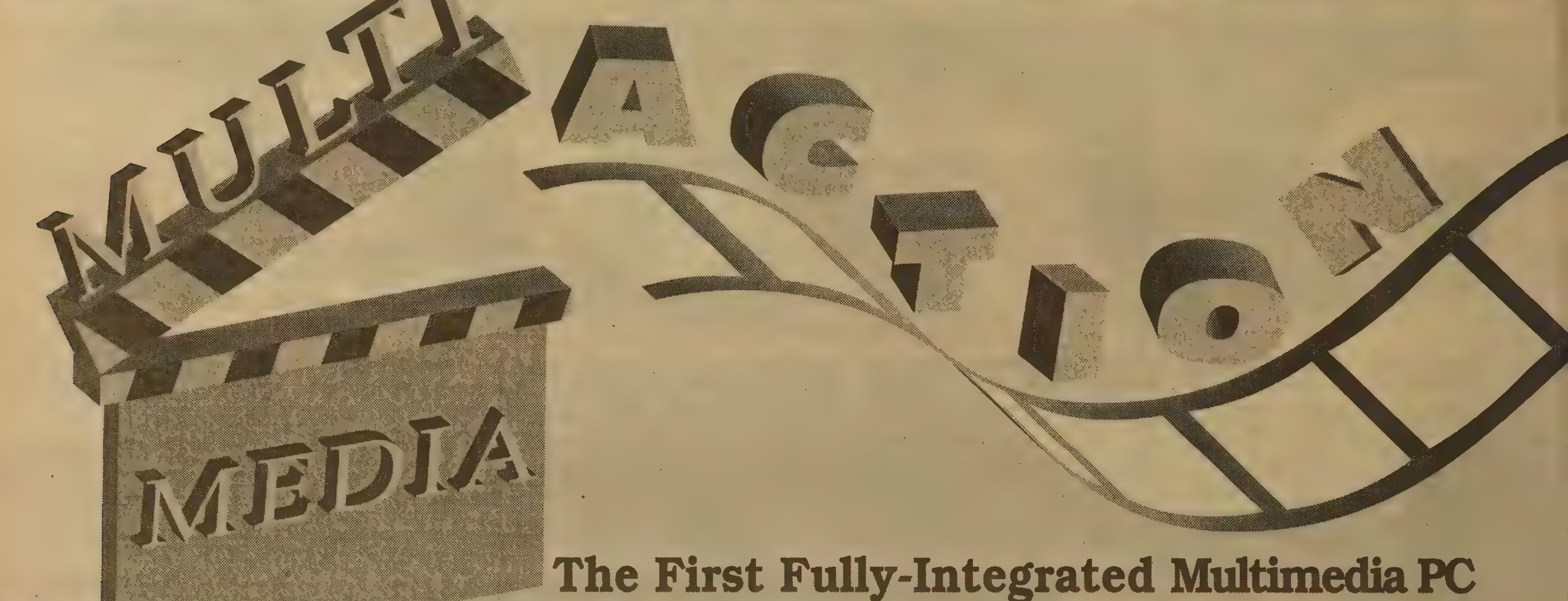
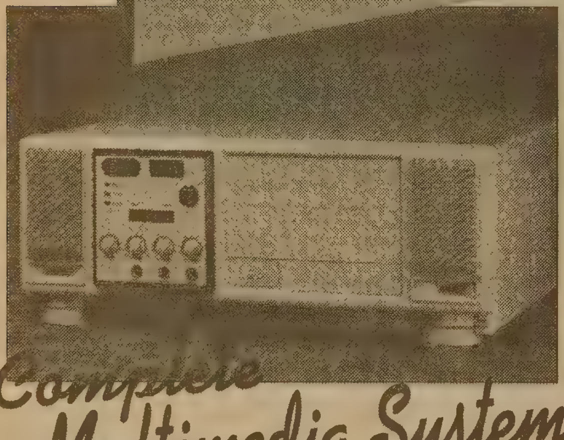


The First Fully-Integrated Multimedia PC



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- VLB accelerator 1MB
- 72W 20 per channel
- 101 Enhanced keyboard
- 3-Button Hi-Res. mouse
- FREE Software option
- 2 Built-in speakers

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DX2-50	$1620
DX2-66	$1720
Pentium	CALL

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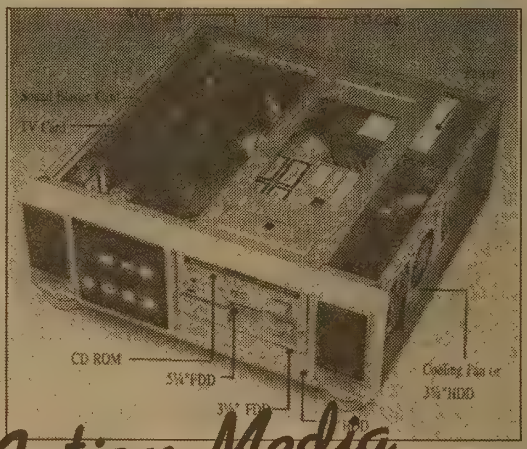

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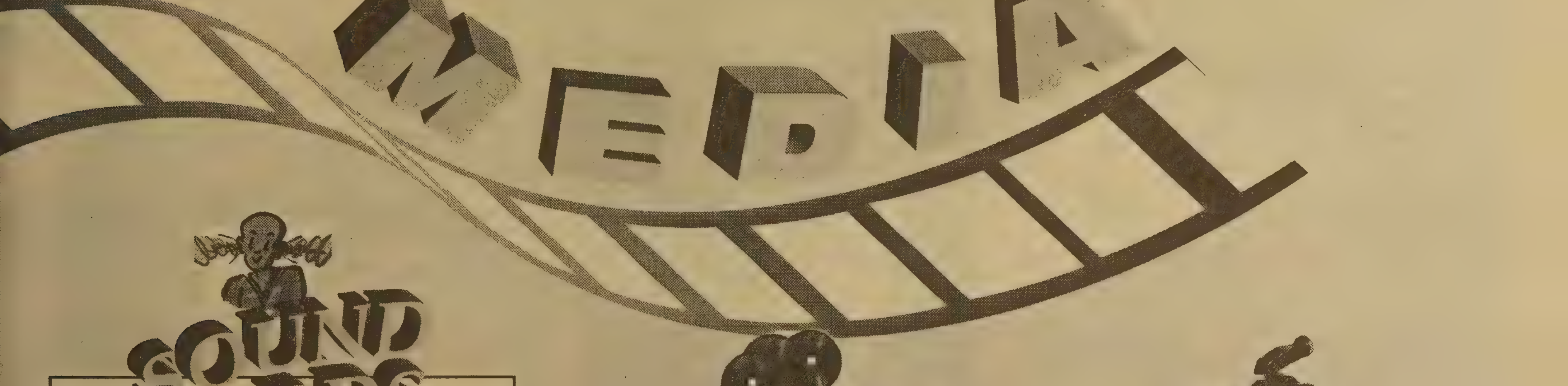

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tem, Dougherty expanded into significant new markets this year with the advent of PDAs. Casio and Tandy shipped Zoomers running GEOS, followed by the Sharp PT-9000. With a clear strategy of being a serious player in the mobile computing market, Dougherty formed alliances with Motorola, CompuServe, Novell, and others and held the first developers' conference to encourage ISVs to write applications for the GEOS environment.

KENNETH DOWLIN
DIRECTOR
SAN FRANCISCO PUBLIC LIBRARY

Amy Titus of Brisbane suggests that we include California's public libraries on this year's list because, as she says, "they have been leaders in information technology. Many people have their first computer contact at a public library. Librarians provide computer information to everyone, for free."

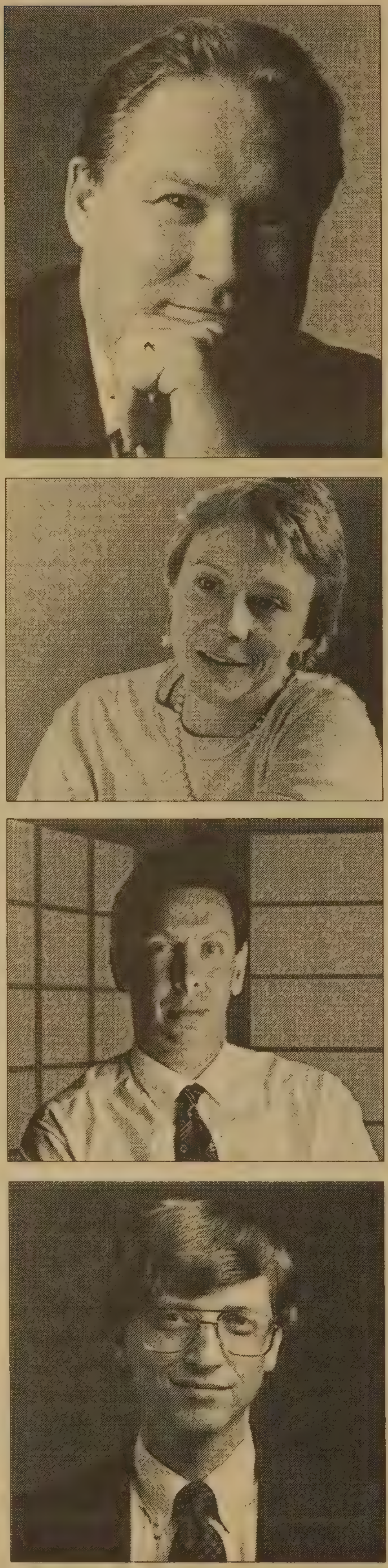
We are delighted to join with her in thanking the state's librarians for their vital work in ushering in the information age, and we think Dowlin deserves particular notice for his pioneering work in getting the San Francisco library system online. According to plan, during 1994 the library will implement a program to allow home, business, and classroom access to the system, as well as community Internet access, full text delivery of documents in other city institutions, and a switched multimedia network to all the local library branches. Actively involved with San Francisco's multimedia community, Dowlin has set a goal of providing switched multimedia access to the home by the year 2000.

ERIC DREXLER
RESEARCH FELLOW
INSTITUTE OF MOLECULAR MANUFACTURING
CHAIRMAN
FORESIGHT INSTITUTE

While we're still waiting for the big breakthrough in nanotechnology, Drexler continues to do research and offer provocative suggestions as to which pieces of the technology might reasonably be implemented next, most notably at the recent Third Foresight Conference on Molecular Nanotechnology. His highly technical book *Nanosystems* has sold exceptionally well as such books go, having entered its second printing and sold over fifteen thousand copies so far, and was given the Award for Excellence in Professional and Scholarly Publishing in the computer science category by the Association of American Publishers. Drexler was also presented by industrialist Jack Kilby with the Kilby Young Innovator Award for his work on nanotechnology.

JOHN C. DVORAK
COLUMNIST

Dvorak continues to delight his readers and annoy his adversaries with columns, books, and advice. Aside from his role as a significant information source, he's one of the primary forces likely to keep the industry from getting boring, what with his frequent trips to the future and other alternate realities that mysteriously resemble our own.



Top to bottom: John Dvorak, Esther Dyson, Larry Ellison, Bill Gates.

ESTHER DYSON
EDITOR
RELEASE 1.0, REL-EAST

Long a major influence on the industry with the *Release 1.0* newsletter and PC Forum conferences, Dyson has devoted much of her energy lately to building up entrepreneurial high-tech businesses in the former Eastern Bloc, where technical expertise is great and money is scarce. She's been instrumental in catalyzing some interesting alliances, for example connecting the Russian handwriting-recognition wizards at Paragraph with Apple, resulting in Paragraph's technology being incorporated into the Newton.

LARRY ELLISON
PRESIDENT AND CEO
ORACLE

Not that he's slacking off in his domination of the corporate data-processing world, but these days Larry Ellison has set his sights beyond the conventional notion of relational databases to an all-encompassing vision of digital commerce. He's invested significant amounts of his own and Oracle's resources in massively parallel computer technology, which he believes is the key to moving multi-terabyte content such as on-demand movies along the digital highway to come; the result is not only short-term advantage to the database giant whose software is among the relatively few to take advantage of massively parallel systems, but a tactical advantage for becoming the virtual warehouse for the infinite variety of information destined to be bought and sold on the global network.

MARK EPPLEY
CHAIRMAN AND CEO
TRAVELING SOFTWARE

PDAs were everywhere in 1993, and Traveling Software went right along with them. Among the key products in which Traveling Software's involved: the HP OmniBook 300 and 95LX, the Apple Newton, and a host of Sharp Wizards. Eppley's sense of emerging trends has enabled the company's technology, notably its line of LapLink products, to become an integral part of mobile computing.

ED ESBER
PRESIDENT AND CEO
CREATIVE LABS

Last seen on this list some years back as the CEO of Ashton-Tate, Esber has found new challenges and rewards in the PC multimedia market with this US branch of Singapore-based Creative Technology.

continued on page 124

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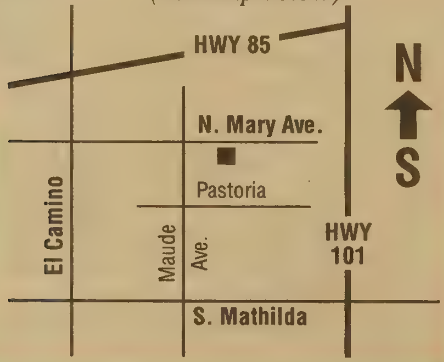

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continued from page 118

Long an industry leader in the audio field with its Sound Blaster card, Creative is finding a lucrative new market in PC multimedia upgrade kits, both under its own name and with a list of OEM customers that includes IBM, Dell, and AST.

What's next? Well, like a lot of other vendors, Creative's going into the interactive CD-ROM business. They announced a consumer karaoke kit at COMDEX, and Esber said their goal is to become "the Rhino Records of karaoke."

DAVID, JOHN, AND RANDY FRY

FOUNDERS

CHARLIE YANDELL

DIRECTOR OF COMPUTER OPERATIONS

FRY'S ELECTRONICS

Something of a rarity in a hype-intensive industry, the Fry Bros. send out no press releases and avoid the spotlight. However, they keep right on opening stores, one in Campbell and one in Fountain Valley, providing the technical community with a unique one-stop source for all their needs from SIMMs and systems to magazines and Doritos, and an ever-growing repertoire of bizarre retail decorating schemes. Yandell keeps the day-to-day operations of this distinctive retail phenomenon on track.

BILL GATES

CHAIRMAN AND CEO

MICROSOFT

Despite celebrity status, a position as one of the world's richest men, the chairmanship of a company that bypassed General Motors some time ago, and a position in the operating system market that envious competitors discuss in terms reminiscent of nineteenth-century Standard Oil, Gates remains far from complacent in his ongoing battle to keep Microsoft on top.

Still, with the advent of multiplatform Windows NT, Microsoft stands to enter new markets. Not content with expanding Windows to platforms from pen-based computers to client-server networks, it's making alliances in the entertainment and cable industries. All in all, despite the fond hopes of competitors, Gates appears unlikely to let down his guard any time soon.

MARK GRAHAM

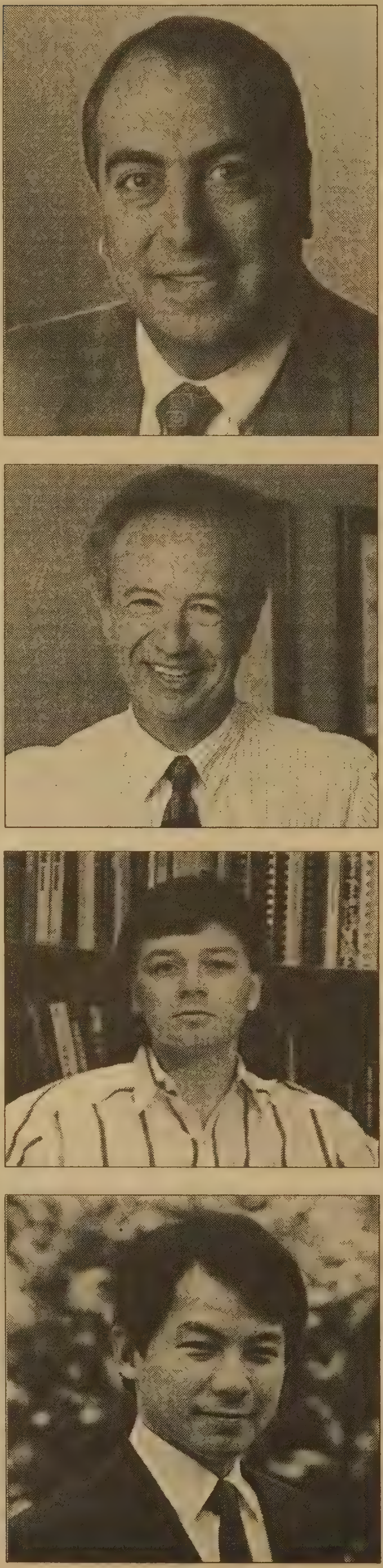
PRESIDENT

MITRA

TECHNICAL DIRECTOR

PANDORA SYSTEMS

Both Graham and Mitra are longtime veterans of the online world: Graham previously cofounded the Institute for Global Communications and was the director of PeaceNet; Mitra was the founder and director of GreenNet in the UK and more recently worked on Internet applications such as Gopher and WAIS. At Pandora, they worked on a number of significant projects during 1993, notably the network service for WIRE, the women's online service, and the WAIS and Gopher gateways for America Online's Internet Center. They've also been working extensively to help develop the Internet in the former Soviet Union, providing a vital resource during a traumatic economic transition.



Top to bottom: Edward Esber, Andrew Grove, Mark Graham, George Hara.

ANDREW GROVE

CEO

INTEL

Another good year for Intel, 1993 found the Pentium shipping to eager users, the 486 in its infinite varieties taking hold in machines from notebooks to superservers, and platoons of operating system vendors rushing to port their software to the Intel environment. While it's nice to be popular, the hard-driving Grove is not one to rest on his laurels, having seen all too many existence proofs that today's industry standard is tomorrow's archeological curiosity; he's leading Intel on an aggressive course in areas from embedded processors to multimedia to communications, and furthermore has no intention of letting the vaunted PowerPC erode Intel's empire.

GEORGE HARA

FOUNDER

ALLIANCE CONFERENCES

Having pioneered the concept of international high-tech startup some years ago, Hara is an effective promoter and facilitator of US/Japanese collaborations and joint ventures. The Alliance conferences, held yearly in Japan, bring high-level industry executives from both countries together with entrepreneurs for idea sharing and the formation of mutually beneficial alliances, and have been responsible for the creation of some noteworthy partnerships.

MARK HASS

EXECUTIVE DIRECTOR

COMPUTER RECYCLING CENTER

While others simply bemoan the widening gap between the info haves and have-nots, Mark Hass did something about it. Inspired by the desperate need of Bay Area schools for computers and the large number of perfectly good, if somewhat outdated, computers being discarded by upgrading businesses every week, the former robotics engineer founded the Computer Recycling Center, now housed in Mountain View. Each week the nonprofit Center takes dozens of cast-off computer systems, repairs them, and donates them to needy schools, along with software.

TRIP HAWKINS

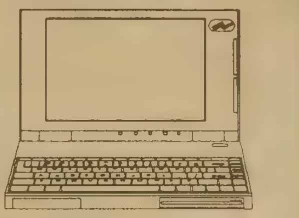
PRESIDENT

3DO

As we go to press, the 3DO multimedia platform is experiencing its crucial first holiday season, in

PC WAREHOUSE

World of Notebook



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which it remains to be seen whether its new, CD-ROM-based standard can make significant inroads against the cheaper and ubiquitous Sega and Nintendo. Initial offerings for the players based on the 3DO standard run toward graphically superior versions of the usual shoot-'em-ups, but Hawkins envisions the technology as a gateway to everything from home shopping to game-playing on the global network.

MARK HOFFMAN

CHAIRMAN, PRESIDENT, AND CEO

SYBASE

Hoffman has led Sybase from a tiny 1984 startup to its current status as a large public corporation rapidly approaching a half-billion dollars in annual revenues. A pioneer in client-server computing, Sybase has kept a technological lead in the online enterprise-wide computing arena and continues to gain market share, with its database and connectivity tools available on platforms from desktop to mainframe.

DAVE HUGHES

DAVE@OLDCOLO.COM

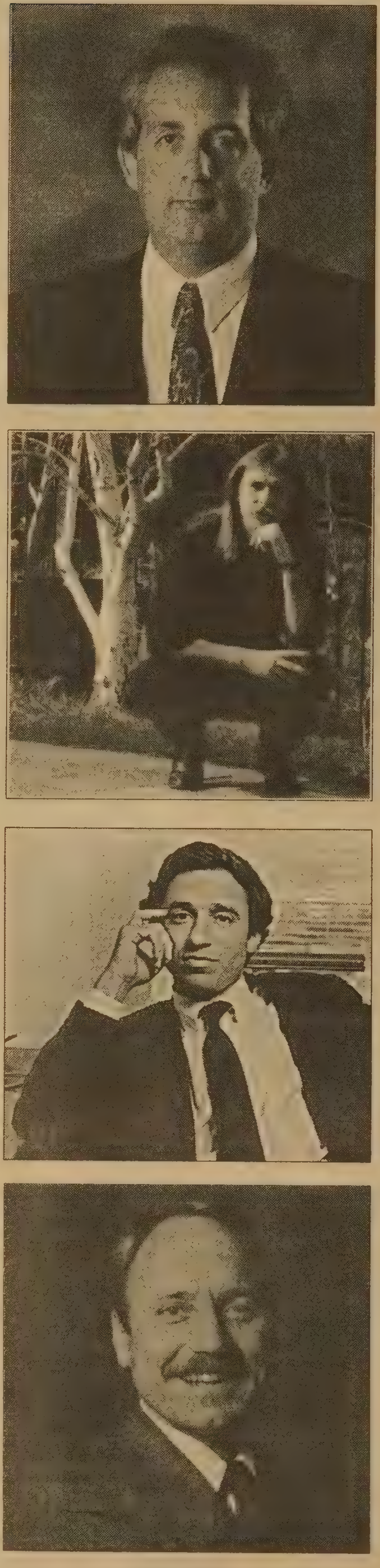
Telecommunications pioneer Hughes was on to further adventures last year—having campaigned at length to convince the modem-using populace that the NAPLPS standard was the great hope for moving graphics, animation, and non-Roman text over the global phone lines, he was constantly frustrated by the lack of good telecommunications software implementing the protocol. In 1993, his problem found an elegant solution and, for a very minimal expenditure of hard currency, he was able to enlist the services of Russian software wizards to write a program called Teledraw. The results were so good that Hughes is now plotting further collaborations with Andrey, Sasha, et al. to enable an ongoing process of phone access to everything from classroom whiteboards to Indian art.

STEVE JACKSON

PRESIDENT

STEVE JACKSON GAMES

Longtime readers will recall the 1990 incident in which Steve Jackson's business was nearly destroyed by overzealous Secret Service agents in ostensible search of the E911 document, who seized all his company's computer equipment, damaged most of it, and didn't return it for months, meanwhile reading private email stored on the company's BBS and generally engaging in egregious conduct. In a case with wide constitutional implications, Jackson and the EFF brought suit against the Secret Service, and in April 1993 federal district court Sam Sparks ruled in Jackson's favor, assessing the Secret Service $50,000 in damages, plus Jackson's attorneys' fees. In scathing terms, Sparks made it clear not only that the Fourth Amendment's protections against unreasonable searches and seizures applied to computer owners, but that special legal protections of publications extend to the digital world, where the concept of "publishing" is undergoing rapid change.



Top to bottom: Mitch Kapor, Kai Krause, Jim Manzi, Mark Hoffman.

PAUL JAIN

PRESIDENT AND CEO

MEDIA VISION

Jain and others cofounded Media Vision in 1990 to take advantage of the emerging multimedia market. Since then he's led the company to a position of industry prominence with retail and OEM products ranging from audio kits to interactive CD-ROM games and voice-activated daily planners. The company's growth has been explosive since it shipped its first product in 1991, and its rapid development cycles and distribution arrangements position it well for a significant role in the future.

TIM JENISON

PAUL MONTGOMERY

FOUNDERS

NEWTEK

While Commodore continues to struggle for market share, one device, the NewTek Video Toaster, remains arguably the leading driver of Amiga sales. The founders' brainchild came out in a new release, the Video Toaster 4000, during 1993, and finds ever-wider acceptance in the video industry. Used by Foundation Imaging in its Emmy-winning effects for *Babylon 5*, the Toaster has become an indispensable tool for the budget-minded video professional and amateur alike, and its creators keep adding new capabilities.

STEVEN P. JOBS

CHAIRMAN

NEXT

On the occasion of the Macintosh's tenth birthday, it is only appropriate to note the profound change in the lives of millions of people as a result of Jobs' vision. Otherwise, while it cannot be said that 1993 was a banner year for NeXT—the company made a wrenching decision to get out of the hardware business entirely and focus on making its innovative software available on the Intel platform—it's also clear that the company may well have a strong future in the software business. Whether NeXTstep can prosper in the platform wars to come remains to be seen, but Jobs has been defying the odds to good effect for years.

REESE JONES

CHAIRMAN AND CEO

FARALLON

Since the days when he spun Farallon off from BMUG, Jones has parlayed a keen sense of emerging markets and an ability to combine innovation and affordability into a product line far beyond PhoneNet. During 1993, the company launched a number of breakthrough offerings to address the

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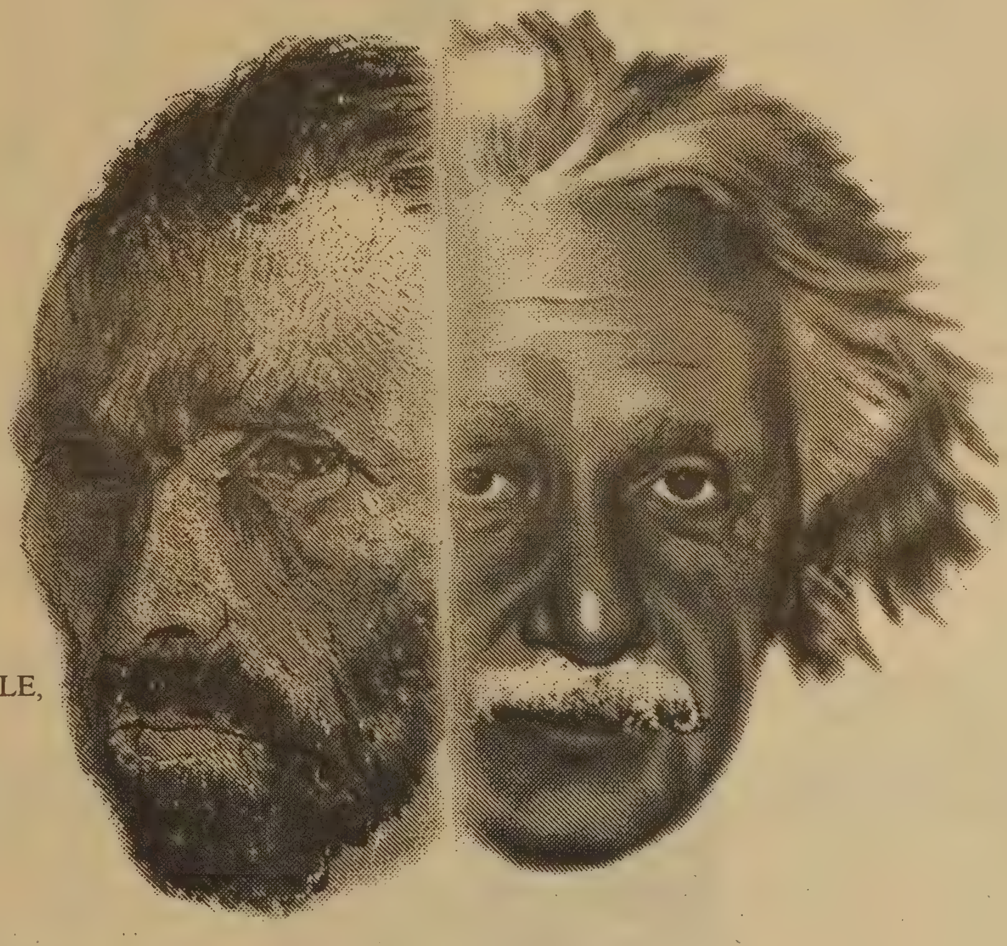

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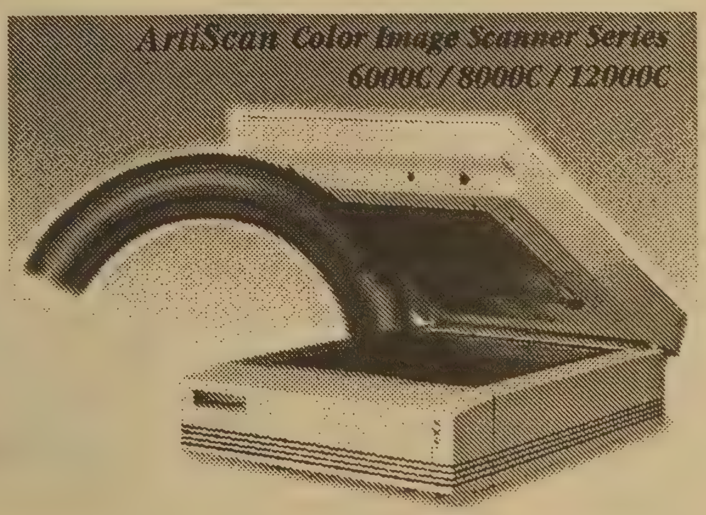

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changing needs of today's heterogeneous and often mobile networks, notably the EtherWave technology for easy connection of laptop computers to Ethernet networks. It also threw something of an obstacle in Adobe's plans to make its Acrobat technology a PostScript-like standard for document handling by marketing its Replica technology and giving away the reader software, a key differentiation over Adobe's pricier product.

BREWSTER KAHLE

PRESIDENT

WIDE AREA INFORMATION SERVERS, INC.

Inventor and architect of the WAIS electronic publishing software now in use across the Internet, Kahle started the commercial WAIS Inc. to exploit the many-to-many publishing opportunities of the Internet. Just as the free WAIS software on the Internet allows users to retrieve information from all over the world, WAIS Inc. seeks to provide an alternative to paper and other cumbersome distribution media for both public and commercial information providers. As the company literature states: "Electronic publishing does not mean a few, proprietary information providers. It means access to related information wherever it might reside, and the opportunity to publish for anyone with something to say." We await future developments with interest.

PHILIPPE KAHN

CHAIRMAN, PRESIDENT, AND CEO

BORLAND INTERNATIONAL

"As long as you delight your customers," said Kahn recently, "it's all right to get criticism from your peers."

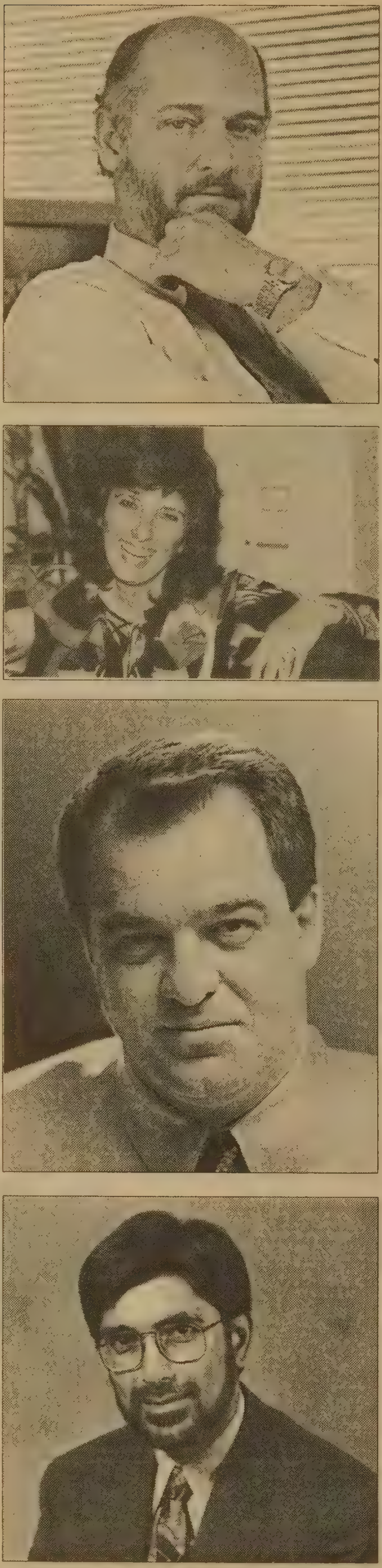
All in all, Borland customers seem to be a pretty happy and numerous lot these days, especially given Kahn's aggressive response to adversity and price wars. No sooner did the Lotus suit go against Borland and Judge Keeton order the recall of all copies of Quattro Pro than Borland shipped a new and noninfringing version. Then, in a quest to attain major market share, they dropped the price to an introductory $49.95, selling half a million copies within six months.

Kahn's busy positioning his company for what he terms "upsizing"—moving from desktop PCs to networks and client-server environments. Two strong database products and the promising Interbase engine, object-oriented tools offering quicker development cycles, and technology and marketing agreements with leading hardware and software vendors stand to keep Borland a strong contender in new, more complex computing environments.

JUDGE ROBERT KEETON

US DISTRICT COURT

While the merits of his decision are likely to be hotly debated for generations to come, Keeton ended years of speculation in 1993 by deciding in favor of Lotus and against Borland in the now-legendary look-and-feel lawsuit. The case's full implications will probably not be apparent for years; it may have raised as many questions as it answered, but it has certainly had a profound influence on the design of software with regard to competitors' products.



Top to bottom: David Liddle, Therese Myers, , Safi Qureshey.

SAT TARA S. KHALSA

CHAIRMAN AND CEO

INFONOW

We've probably got a few years to go before we attain the level of VR-based online shopping profiled in Doonesbury. Meanwhile, Khalsa is an early adopter of an intermediate approach, in which vendors and customers communicate directly, thanks to a CD-ROM catalog and an 800 number—what Khalsa calls a "virtual store." Currently bundled with PCs from a number of vendors including IBM, InfoNow's discs are a model of just-in-timeness: they contain encrypted versions of dozens of applications, to which the customer gets the key upon ordering the application from InfoCorp. Khalsa maintains that this distribution approach stands to save corporate America significant expense—he says the processing cost of a purchase order is around $75–$100.

BRUCE KOBALL

CHAIRMAN

THIRD CONFERENCE ON COMPUTERS, FREEDOM & PRIVACY

In 1993 Chairman Koball put together another stellar event in the ongoing series of CFP conferences, at which law enforcement, civil libertarians, lawyers, hackers, cryptographers, and assorted interest groups weigh the conflicting issues and possible solutions as computer technology changes the way we live and work.

BARRY KORT

"MOULTON"

MICROMUSE

WELL conference czar Gail Williams, who knows a thing or two about online worlds, recommends Kort for this year's list in honor of his work on MicroMUSE, a computer-based universe that's home to a "place" called Cyberion City. A retired network planner with twenty years' experience for such organizations as Bell Labs, NASA, and MITRE, Kort decided to put his skills to work furthering education. As he told Howard Rheingold in *The Virtual Community*, "I knew that if we could create a suitable play space, children would learn at remarkable rates, and they would learn a wide range of skills and subject matter." Since he and collaborator Stan Lim set up MicroMUSE, over two thousand users (children and adults) have come along and studied science in a virtual museum, taken courses at an online university, and other-

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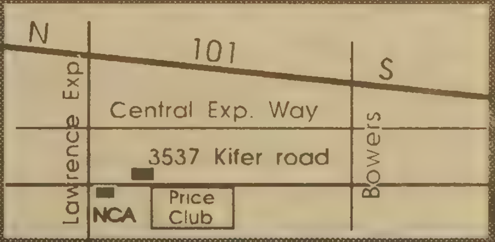


wise built up everything from shopping malls to amusement parks.

KAI KRAUSE
EXECUTIVE VICE PRESIDENT
HSC SOFTWARE

Special effects expert Krause has become a leading force in the computer graphics world. Aside from unleashing the Kai's Power Tools set of Photoshop enhancements on an unsuspecting populace, he's the driving force behind HSC's pioneering role as an information provider on America Online; the company's forum serves as a vital resource to graphics professionals and eager beginners alike.

A frequent speaker at industry gatherings and a faculty member at the American Film Institute, Krause serves as a continuing impetus for innovation on the artistic side of technology.

ED KROHL
AUTHOR
THE WHOLE INTERNET USER'S GUIDE AND CATALOG

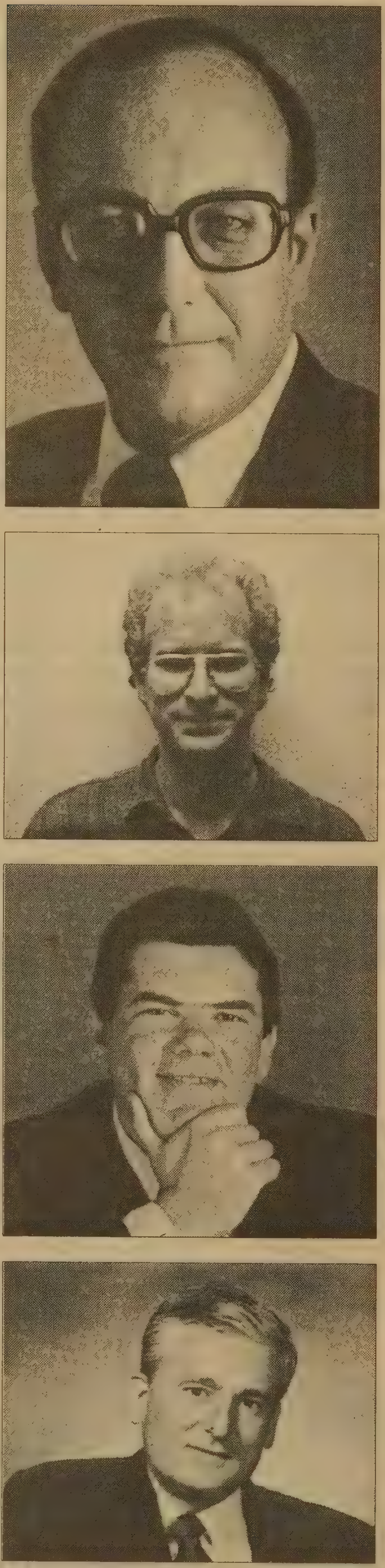
The book against which all subsequent Internet guides are measured, Krohl's work has emerged as an indispensable reference to beginners and seasoned travelers alike as they venture out on the data highway.

JACKSON LAN
PRESIDENT
SOUTHERN CALIFORNIA CHINESE COMPUTER ASSOCIATION

No vendor is a island in this industry; working together in mutually beneficial ways is the key to success in the '90s. Jackson, the 1993 president of SCCCA, helped members of the various constituencies in the local PC community, from OEMs and engineers to dealers and VARs, network and build a stronger industry.

GILMAN LOUIE
CHAIRMAN
SPECTRUM HOLOBYTE

Over the last few years Louie's brought his company through some perils worthy of the scarier multimedia dungeons, all the while keeping it at the leading edge in the gaming marketplace. In addition to its longtime bestsellers, the F-16 flight simulators and the Tetris series, Spectrum now goes where no software company has gone before, having entered an exclusive licensing agreement with Paramount Pictures to produce computer games based on *Star Trek: The Next Generation.* With investors ranging from VC firms to AT&T and Paramount, and its recent merger with MicroProse, its former chief rival in the flight simulator arena, Spectrum is well positioned for the coming convergence of technology and entertainment.



Top to bottom: Lewis Platt, Brewster Kahle, Philippe Kahn, Robert Kavner.

JIM MANZI
PRESIDENT, CHAIRMAN, AND CEO
LOTUS DEVELOPMENT CORP.

Many software giants of the personal computer revolution became unduly dependent on a single product, failed to change with the times, and disappeared. Manzi has confounded his critics by successfully guiding Lotus through a transition from a spreadsheet company (though 1-2-3 is still doing fine) to a veritable solutions empire. Its Notes software, which Manzi supported through an arduous development process, has become the industry leader in enterprise-wide collaboration, and is becoming a standard across hardware platforms.

MICHAEL MCCONNELL
PRESIDENT AND CEO
SUPERMAC TECHNOLOGY

McConnell has led SuperMac to outstanding success in the booming worlds of multimedia and color publishing; its technology such as the VideoSpigot brings unprecedented power and ease of use to graphics and video professionals on both Mac and Windows platforms. McConnell's been able to keep SuperMac growing and profitable while many of his competitors struggle, and appears determined to keep the company on the leading edge—when his marketing VP Steve Blank resigned to start Rocket Science Games, McConnell was quick to invest on SuperMac's behalf, and also to cross-license the video compression technology Rocket Science will be developing for its CD-ROM games.

SCOTT MCNEALY
CHAIRMAN, PRESIDENT, AND CEO
SUN MICROSYSTEMS

McNealy's kept Sun well ahead of its competitors in the workstation market, with its ever-faster SPARC hardware, its dual-platform Solaris operating system, and strengths in dealing with a multiplicity of networking issues. The company's venerable slogan "the network is the computer" has served to align it well with the trend to ever-greater connection of everything with everything else, and made it the mainstay of government, financial, corporate, and research computing systems.

JOHN MORGRIDGE
CEO
CISCO SYSTEMS

Morgridge has leveraged Cisco's early advantage in router technology to a preeminent position in the explosively expanding network field. The heterogeneous computing environments of today's corporations take advantage of Cisco devices to move data rapidly and seamlessly, and even now a major portion of the bridges on the Internet Data Highway are built by Cisco. Already achieving phenomenal growth and return on investment (the

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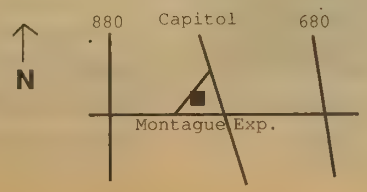


stock's split three times since its IPO in 1990), the company stands to be one of the key architects of tomorrow's networks.

Nathan Morton

Chairman and CEO

CompUSA

Giving mail-order companies a run for their money, retail veteran Morton kept expanding CompUSA into more metropolitan areas, making it the undisputed national leader among computer superstores. So far his attention to service and support and his use of sophisticated point-of-sale technology have worked well to keep the retail giant responsive to its customers and market changes, and the company's sales are expected to top $2 billion in the next year.

Therese Myers

President and CEO

Quarterdeck Office Systems

Optimizing the price/performance ratio is an ongoing quest with Myers, who continues to drive Quarterdeck's efforts to provide versatile tools that help individual and networked users get the most out of not-necessarily-state-of-the-art hardware. In addition to the time-honored DESQview and QEMM tools for the DOS environment, the company is facilitating the migration of DOS users into multivendor environments with its DESQview-X products, which lets DOS machines operate as terminals on a UNIX XWindows network.

Newton Team

Apple Computer

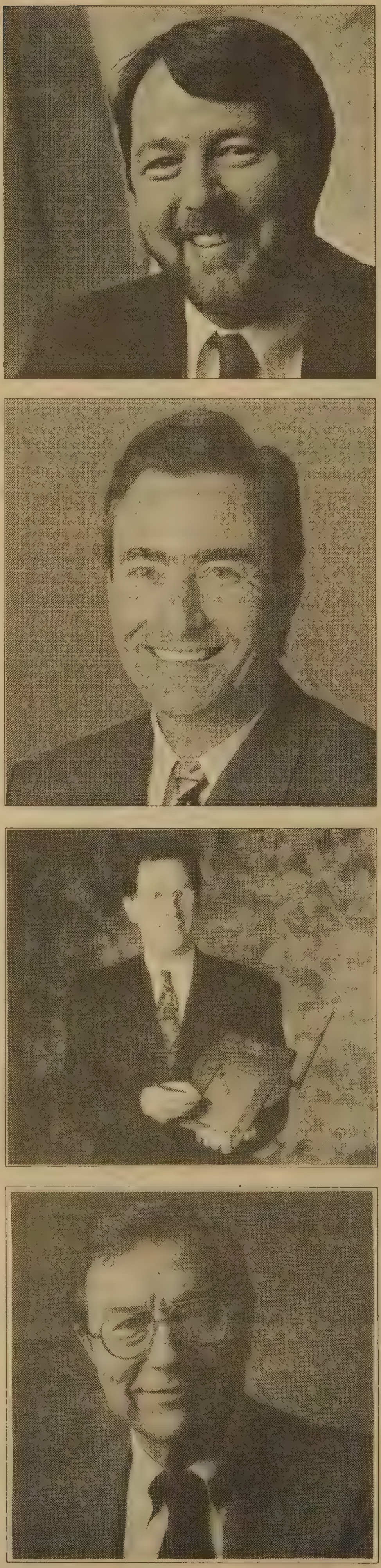
Like a number of significant developments of 1993, the Newton evolved over several years and required the intense collaboration of hundreds of people. Not unlike the Macintosh, it came to market in a form that was a considerable departure from its original concept; not unlike the Macintosh, it's the product of passionate fervor and zeal. It remains to be seen whether the hopes Apple's pinned on the technology will come to fruition, but in true Apple fashion, the hearts-and-minds campaign has been so successful that PDA users are frequently greeted with questions about their "Newton."

Ray Noorda

Chairman, President, and CEO

Novell

While the 69-year-old Noorda, who built Novell from near-ruin to the industry leader in networking, might initially seem an unlikely candidate for pitched battle with Bill Gates in the OS wars, he's been deliberately assembling strategic components to augment the company's historic strengths in LANs. In one of 1993's most startling acquisitions, Novell bought the UNIX operating system from AT&T, thereby presenting a formidable challenge to Windows NT before it ever shipped, and late in the year announced a new version of its Digital Research-created DOS to compete with the MS variety. It remains to be seen whether these disparate pieces can be effectively combined into a Microsoft killer or even a slower-down of Microsoft momentum, but Noorda's been surprising people for years now.



Top to bottom: Reese Jones, Trip Hawkins, Alain Rossman, Ray Noorda.

John Norstad

Author

Disinfectant

Macintosh users sleep better and spend less money thanks to the tireless efforts of Norstad, who keeps his virus-killer updated at a rate that's the envy of commercial antivirus vendors, and best of all makes the program available for free, so people can pass it around without worrying about the tap on the shoulder from the Software Police.

Robert Palmer

President and CEO

Digital Equipment Corporation

Taking over DEC from ousted founder Ken Olsen, Palmer was faced with the awesome task of turning around a company with some good technology and quarterly losses in the hundreds of millions. While it's not out of danger yet, Palmer's made good progress in cutting losses and moving DEC's product line from the outmoded VAX technology to the super-fast Alpha chip, as well as collaborating far more closely with third-party software vendors than had been DEC's historic practice.

Eckhard Pfeiffer

President and CEO

Compaq

Pfeiffer has done a phenomenally effective job of reversing the lagging fortunes of Compaq, which was badly damaged by price wars and dropping margins of the recent past. He's pioneered a new level of customer responsiveness, with an excellent support program and a product line to address markets from MIS to budget-minded consumers, and the company's soaring bottom line shows the result.

Lewis Platt

Chairman, President, and CEO

Hewlett-Packard

Platt became president and CEO of HP in 1992, replacing the retiring John Young. In 1993 cofounder David Packard retired as chairman, and Platt became the first nonfounder to assume that role as well. During his tenure so far he's proved a strong and respected leader, keeping the company on an aggressive course of renewed innovation and excellence on platforms ranging from workstations (where HP's systems are once again posing a formidable challenge to Sun) to palmtops and notebook computers.

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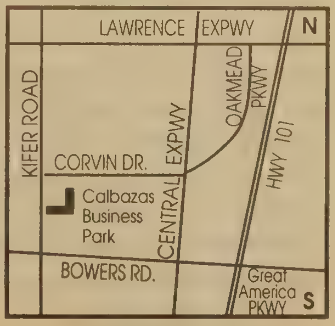


Jerry Pournelle
Columnist and Author

The outspoken and often cantankerous Pournelle remains a reliable source of information to computer users in his *Byte* column, in which the differences between a product's alleged awesome features and actual performance often come to ignominous light. He also takes an active interest in the less mundane applications of technology, from the space program on which he's often advised the government to the science fiction world, in which he's a prolific author.

Lawrence Probst
President and CEO
Electronic Arts

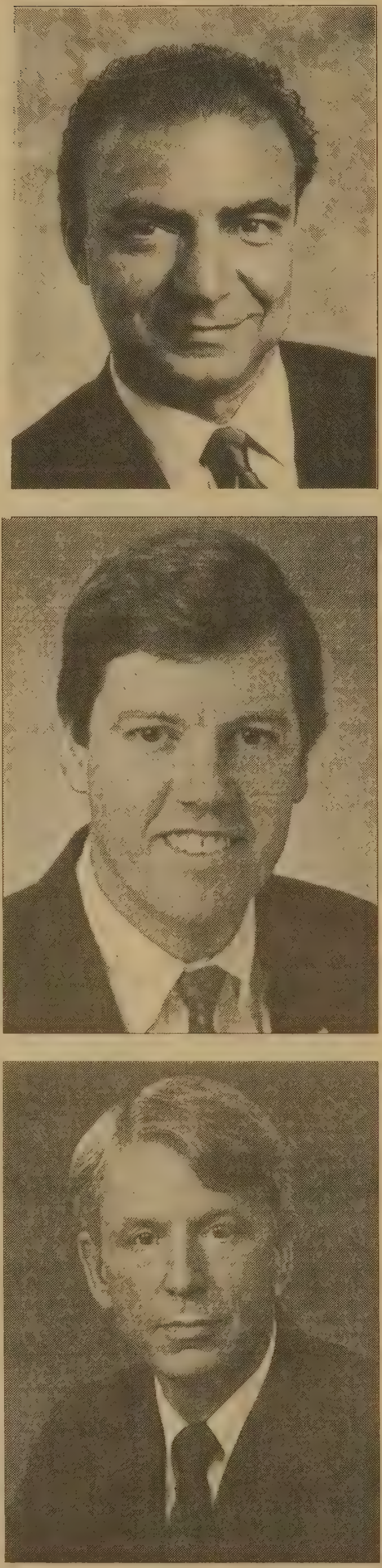
Relatively few game companies that were successful in the early days of the personal computer revolution have been nimble enough to survive the wild fluctuations of the home entertainment market, but Probst has managed to keep Electronic Arts in a leading position. The largest interactive entertainment company in the US, EA has prospered not only because of its market-savvy title development but its ability to anticipate platform shifts. After taking advantage of the wild popularity of cartridge games, Probst now has EA poised on the brink of the CD-ROM revolution, ready to deliver even more high-powered entertainment to throngs of eager consumers.

Safi Qureshey
President and CEO
AST Research

Qureshey laid to rest the oft-expressed doubts about his ability to run AST in the wake of his cofounders' departures, continuing the company's longtime practice of innovation and adaptability to market trends. In what was undoubtedly his most dramatic move of 1993, he acquired the PC manufacturing operations of Tandy, thereby making AST the fourth-largest computer manufacturer in the US and the sixth-largest in the world. While it remains to be seen what Qureshey will make of these new holdings, which include not only Tandy but GRiD and Victor as well as the Zoomer technology, he's certainly well positioned to take advantage of emerging trends in mobile computing.

Howard Rheingold
Author
The Virtual Community

As the Internet found its way into the mass media last year, books proliferated on dealing with its technical complexities. *Whole Earth Review* editor Rheingold found and told a different story—the human side, the relationships and events that wouldn't have existed without computer-based networks. In reading about sick children, dramatically organized disaster intervention, serendipitous collaborations, and passionate feuds, we discover that online interaction holds media-dependent possibilities and limitations, but in the end is fraught with the same human issues as the face-to-face version.



Top to bottom: Paul Jain, Scott McNealy, Jonathan Seybold.

Jack Rickard
Editor and Publisher
Boardwatch

The outspoken and opinionated Rickard continues to publish the indispensable resource for the online community. As more and more people come to terms with the data highway, *Boardwatch* provides the latest coverage of technical, legal, and cultural issues, and Rickard, in fine BBS fashion, both enlightens his readers and keeps them on their toes with lively arguments.

T.J. Rodgers
President and CEO
Cypress Semiconductor

The flamboyant Rodgers has probably garnered more attention lately for his take-no-prisoners management style and pronouncements thereon than for his company's technology. (*Fortune*, for example, recently gave him a prominent position in its list of Toughest Bosses.) Furthermore, he's not averse to suggesting how the country should be run to anyone who'll listen.

Nonetheless, after a year of rocky reorg in 1992, Rodgers' style and skills are clearly good for Cypress, which enjoyed success in targeted niche markets and expanded into mass markets by supplying cache memory modules for IBM's ValuePoint line. In a move Rodgers explained as part of a continuing strategy to expand into the broad personal computer market, Cypress also is in the process of acquiring IC Designs, whose specialized components are used by leading PC vendors worldwide.

Jerry Rogers
President and CEO

Tom Brightman
Vice President of Business and Technology
Cyrix

It takes a liberal dose of both technical expertise and chutzpah to position one's company as "the intelligent alternative to Intel," but newcomer Cyrix, which went public in July, has managed to find wide acceptance in the OEM arena with its specialized Intel-compatible chips. A number of 486-compatible chips shipped in 1993 were especially well received in the notebook and upgrade markets.

Cofounders Rogers and Brightman, both microprocessor-industry veterans, pioneered new techologies that allowed significant savings by enabling the testing of software compatibility and other crucial factors at the design stage, a factor

continued on page 218

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Our DeskPro Office and MultiMedia Systems features a motherboard with 256K Cache, 32MB RAM expandability, Blue Overdrive/2 ZIF Socket w/Metal Handle, CPU cooling fan and heat sink, 3 VLB Expansion slots, and 5 additional 16 bit slots, AMI Bios, Opti Chipset and Megatrends support chip on board. With 16 bit Soundblaster card, Mitsumi Dual Spin CD Rom Drive, with optional 40-45 Watt Stereo Speakers, 9600/2400 Send Receive Fax/Modem, and 32 Bit Windows Accelerator and 32 bit IDE Controller, and CD Software Selection, this system is truly a MultiMedia Center ready to go.

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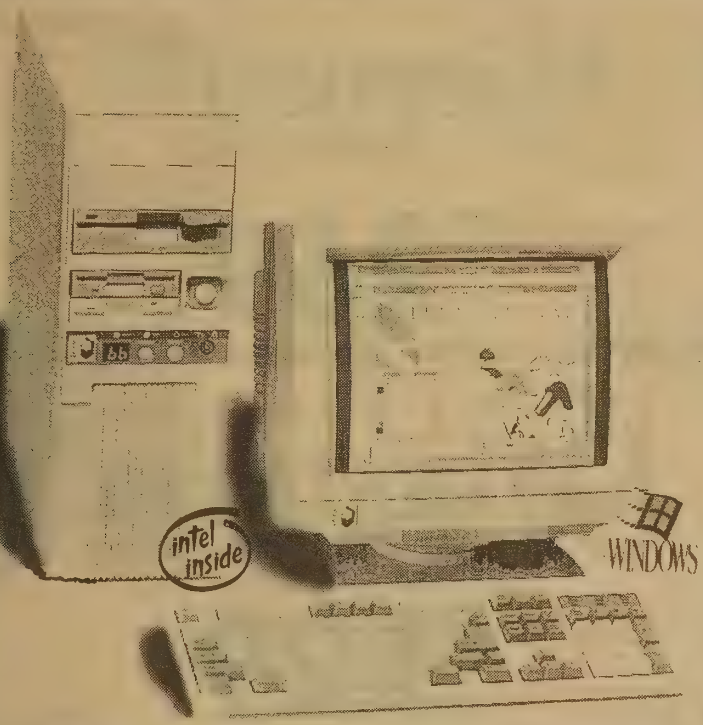

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- VESA Local Bus Video Accelerator w/1MB
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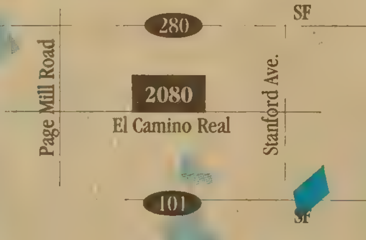
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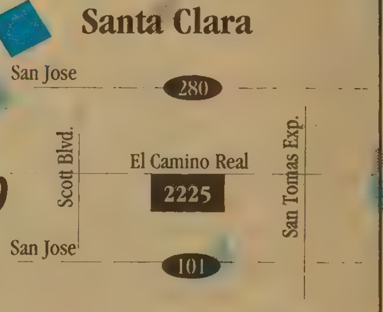
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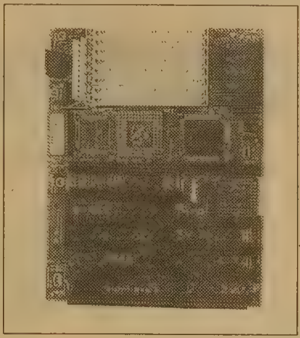

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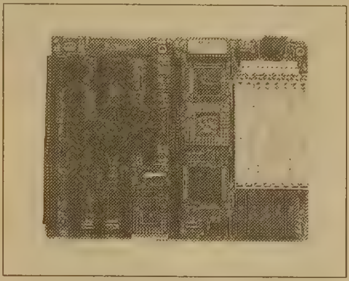

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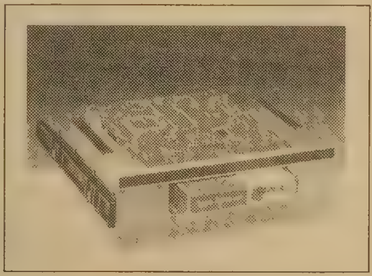

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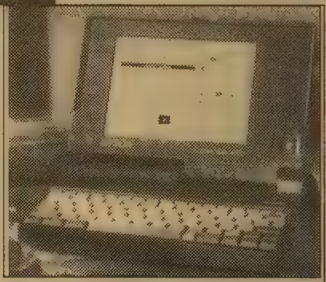

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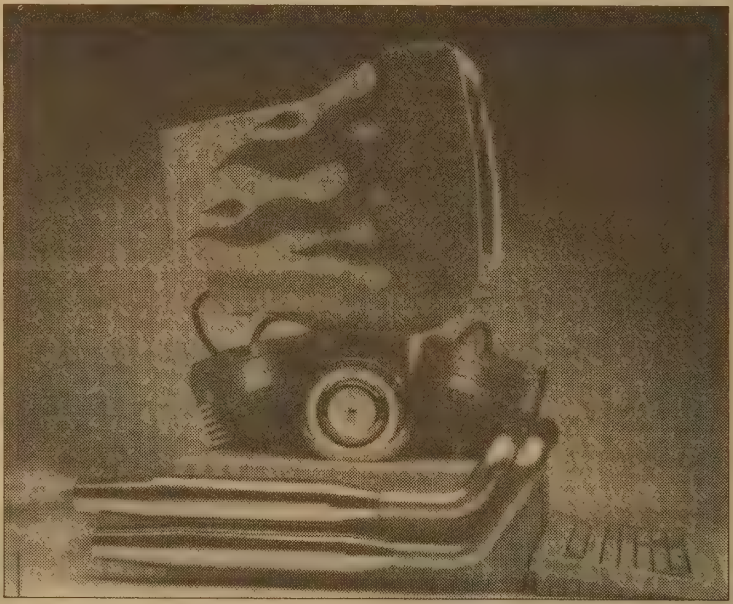

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- ◊ Four ISA option slots
- ◊ Three drive bays

Your Choice of Intel Processors:

- ◊ 486SX/33
- ◊ with a 3.5" 1.44MB FDD along with your choice of 120MB.

*EPSON Progression #1 Windows Performance in its class**

** #1 in Wintech Benchmark test.*

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Canon

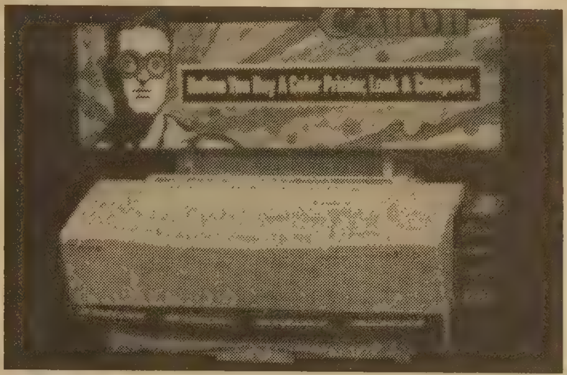
BJC-600 Color

BJC-600 Color Ink Jet Printer

- ◊ 360 dpi
- ◊ 240cps draft, 170cps high quality
- ◊ 64 nozzles per color
- ◊ 16.7 million colors available
- ◊ 100-sheet ASF
- ◊ 2 year product warranty

COLOR!

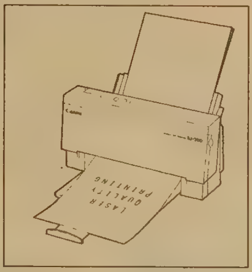
$599



BJ-200 's

BJ-200 Inc Jet Printer

$279

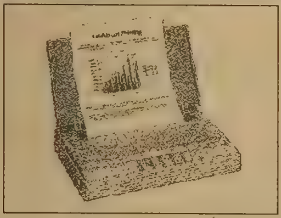


BJ-230 Wide Carriage

$399

◊ Prints up to 248cps ◊ 100-page sheet feeder
◊ 7 resident fonts ◊ Hold up to 10 envelopes

BJ-10sx Portable



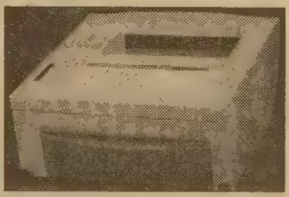
Optional 50-sheet (ASF6420) Cut sheet Feeder $89

- ◊ Prints 30% faster than 10ex
- ◊ Weighs 10% lighter than 10ex
- ◊ Text graphics up to 360dpi
- ◊ Uses plainpaper & transparencies
- ◊ 1 year warranty

$249

LBP-430 Personal Laser Printer

Environmentally Friendly...
Toner recycling program and sleep mode for low power consumption

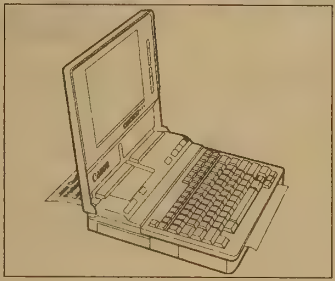


Better than HP4L

- ◊ 4 pages per minute
- ◊ 1MB RAM exp to 5
- ◊ PCL 5 compatibility
- ◊ 22 fonts-8 scalable fonts
- ◊ 2 year product warranty

$599

NoteJet 486



Entire system with battery weighs only 7.7 lbs.

Computer and Printer In One!

486SLC-25MHz
4MB RAM
180MB HDD

- ◊ Powerful Full-Featured 486 Notebook
- ◊ High quality Bubble Jet™ Printer Built-in
- ◊ 2 PCMCIA Expansion Slots
- ◊ Built-in 10 sheet Letter Feeder
- ◊ Preloaded DOS, Windows & NoteJet tutorial, and more...

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Innova 486NXM25

Fully Loaded!

486SX-25MHZ•4MB RAM•120MB HDD

- ◊ Powerful 486SX-25MHz
- ◊ 4MB RAM
- ◊ Fax Modem
- ◊ Built-in trackball
- ◊ Preloaded software: DOS 6.0, Windows, Works & MicroFax

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MX Stealth
Fax Modem

- ◊ 14.4 send/receive data fax
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- ◊ WinFax Lite™ fax software
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External	169.00

14.4 Modem

Internal	145 .00
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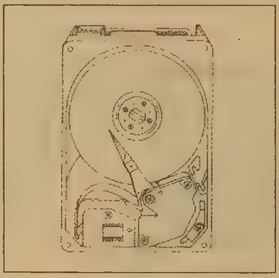
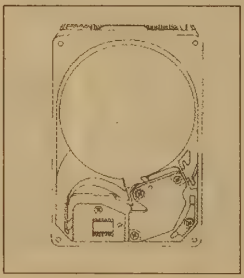
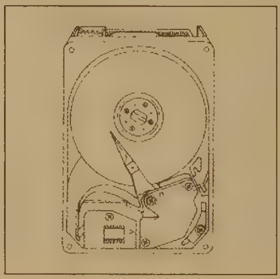
Reliable High-Performance Magnetic Drives to Meet Your Most Demanding Jobs!







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170MB CFA170A, 13ms **$199.00**	**254MB** 30254, 12ms **$218.00**
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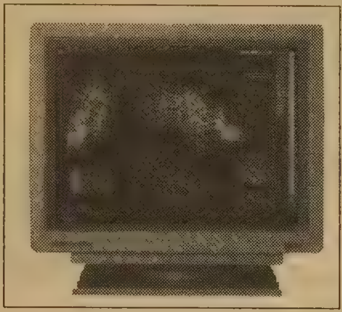
NANAO

17" SVGA Monitor

SAVE $150



F550i

- ◊ 1280x1024
- ◊ .28 dot pitch
- ◊ Flat screen w/ Analog RGB input
- ◊ 1 year waranty
- ◊ Monitor is remanufactured*

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NEW

F340iW15" 1280, .28	529.00
9080i 16" 1024 .28	799.00
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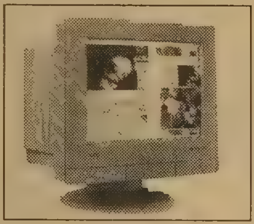
F750 21" 1280 .31	1799.00

NEC Monitors



NEC

MultiSync™ 3V Monitor

- ◊ 15", .28mm flat square CRT
- ◊ 1024x768 at up to 60Hz
- ◊ Energy Star compliance
- ◊ 3 year warranty

$529

Professional Series

5FGp 17" 1024 .28 *NEW!*	1399.00
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SVGA 14" 1024 .28	329.00
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ViewSonic

17"
SVGA Monitor
ViewMatch™
Color Control

- ◊ Up to 1280x1024, 76Hz refresh rate
- ◊ .28mm dot pitch
- ◊ 30-82 KHz scan frequency
- ◊ Analog RGB input

$1069

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Genoa SYSTEMS CORPORATION

8500 VL Turbo
VESA Local Bus
16.7 million color, 32-bit

$119

CARDEXPERT

COBRA VLB
32-bit, 2MB RAM
16.7 million color

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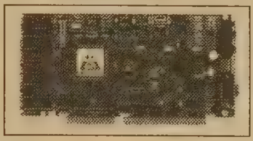
ORCHID



Fahrenheit+ VLB 1MB/2MB	159/199
Celcius VLB 2MB	288

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SpeedStar VLB Pro 24	139.00
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Monitors

14" Color VGA Monitor .39mm
MTN439

$169

15" Color VGA Monitor
by Sigma Design works w/ PC & MAC

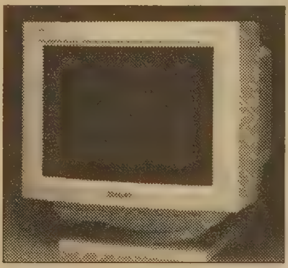
$349

Mitsubishi
17" Monitor .26mm 1280 X 1024

$999

SONY

NEW!



GDM-17SE1

- ◊ 1600x1200 max resolution
- ◊ .25mm dot pitch
- ◊ 50-150Hz vertical scan range
- ◊ Energy Star compliant

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CPD-1430 14" 1024 .25	595.00
GDM2036 20" 1024 .30	1993.00
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Upgrade Kit

- ◊ Sound Blaster 16 Sound Card
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  - • The Animals
  - • Secret Weapons of the Luftwaffe
  - • Monkey Island
  - • Loom
  - • Where in the World is Carmen Sandiego

$469

Media Vision

MEDIA VISION

- ◊ Multisession Double Speed
- ◊ NEC internal CD-ROM drive
- ◊ 350ms access time
- ◊ 4 Top CD Library Titles
- ◊ Pro Audio Spectrum 16 Sound Card
- ◊ And more...

FUSION DOUBLE CD
Fast Bundle

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Pro Audio 16 Basic	99.00
Pro Audio Spectrum16	159.00
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Sound Wave 32

- ◊ 16-Bit CD Quality Sound
- ◊ MPC Level II Compatible
- ◊ 20 MIPs 16-Bit Digital Signal Processor
- ◊ 1 MB of Wavetable Sample
- ◊ Speakers, Microphone, Software

ORCHID

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Game Wave 32

NEW!

- ◊ 16-Bit CD Quality Sound
- ◊ MPC Level II Compatible
- ◊ 20 MIPs 16-Bit Digital Signal Processor
- ◊ Support Sound Blaster ,AdLib General MIDI & MT-32 modes
- ◊ Playback Only

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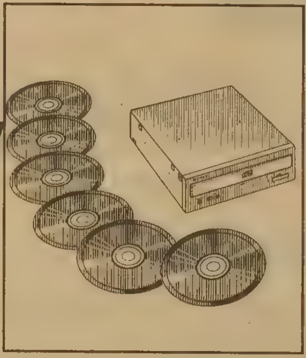
CD ROM System

SONY

Desktop Library
The complete
MultiMedia
CD ROM System



"New Double Speed Drive"

- ◊ Int CD ROM Drive
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Accessories

CD PAKS	
DOS Version	69.00
Windows version	69.00
Edutaiment A Pak	69.00
Edutaiment B Pak	79.00
Speakers	
Labtec 150	18.99
Labtec 550	24.99
Labtec 800	29.99
Labtec 1000	79.98
SOUND CARD	
Gravis UltraSound card	134.00
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Lowest Prices Guaranteed!

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Triple Speed Multispin Reader
CDR-500 Internal
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CDR-600 External
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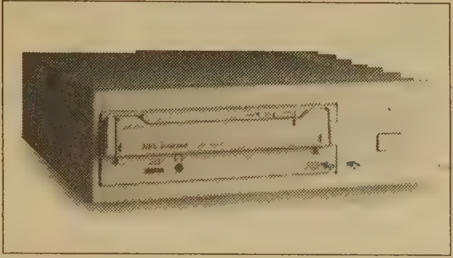

TOSHIBA
XM3401 Internal
200ms Access Time
$345
EXTERNAL $429.00

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562 Internal
320ms Access Time
$199

MITSUMI *New!*
Double Speed, 250ms $199

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CDS-3110 350ms........................ $229

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20% Off Advertised Price!!!

Top 10 List

MS Bookshelf for Windows
Carmen San Diego
World View
So Much Shareware II
Reference Library
Space Quest IV
Wizard MPC
Animal V 1.0 San Diego Zoo
Family Doctor
MIDI Music Shop

Educational Selections

Mavis teaches typing
National Geo-Mammals
MaCmillan Dicrionary for children
Time Table of History
US Atlas
Playing W/Language - French
Mayo Clinic Family Health Book
Great Cities Vol.1
Multimedia Audubon's Birds
Beyond Wall of Stars

Fun & Game

Chessmaster 3000
King Quest V
Library of future 1st
Mixed up Mothergoose
Wind Commander & Ultima VI
Peter & Wolf
DinaSour Adventure
Space Adventure
Mantis Experimental Figher
Who Killed Sam Rupert

9.99 CD Titles

Game Galove
49er Window Games
Hot Shareware
Puzzle 5000
3D Animania
World of Education
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Music Toolbox
Travel to Space
Clipart Library

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- i486 SL DX2 (40 or 50 MHz)
- 4MB RAM Expandable to 20MB
- Removeable/Reversible Screen
- 2 Type II PCMCIA Slots
- MS-DOS & Windows

New

50 Mhz 4MB/340MB HD Mono $3666 / 50Mhz 4MB/340MB HD Color $4865

Silentwriter® 95f

MAC & PC COMPATIBLE

◊ 6 ppm, 2MB RAM exp to 5MB
◊ 35 scalable Adobe fonts
◊ 14 bitmap & 8 scalable HP fonts
◊ HP Laserjet III w/ PCL-5 emulation
◊ Auto Interface Monitoring for easy sharing

$899

Silentwriter® 1097

MAC & PC COMPATIBLE

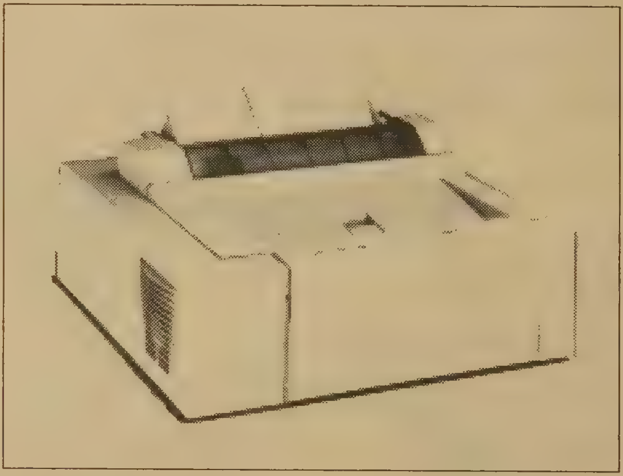
◊ 600dpi Postscript Printer
◊ Adobe Postscript Level 2
◊ HP III (PCL5) Emulation
◊ 10 Pages per minute
◊ 7MB RAM Memory
◊ PhotoMatch™ Gray-scaling
◊ High-speed RISC Processor
◊ 250 Sheet Paper Tray
◊ Microfine Toner
◊ Built-in Convenience Tray
◊ Built-in Auto Emulation
◊ Includes AppleTalk™
◊ Optional 2nd Tray
◊ Optional Ethernet® & Token Ring

$1399

SuperScript™ 610

Laser Window Printer

Ideal for Home & Office!



◊ 300dpi, 6 ppm
◊ 34 scalable Truetype fonts
◊ GDI plus PCL 4
◊ Energy Star compliant
◊ 2 year overnight replacement

***FREE** cleaning kit!**
When you ask any Sales Rep. for a printer Demonstration on SuperScript™610

- Three times faster than competitive printers
- On-screen printer status & control
- Two-year replacement warranty
- See printer demonstration and get a free cleaning kit

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* Quantity limited, Please no substitution

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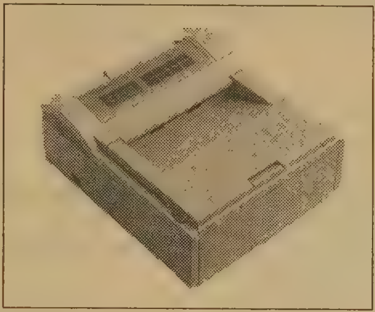
Discount Certificate Amount	$25	$50	$100 $50/$50
Printer Model Applicable	ML380	ML590 ML591 OL400e	ML395/C OL810 OL830+ OL850
Discount Value	Valid for tickets valued at $200+	Valid for tickets valued at $300+	Valid for two $50 discounts for 2 tickets each valued at $300+. must be purchased together, but different passengers and different iteneraries are allowable.

OL400e LED Page Printer



- ◊ Compact Size and sleek design fits comfortably on any desktop
- ◊ Fast 4ppm printing with RISC micro processor for higher productivity
- ◊ 44 fonts for great-looking correspondence and reports
- ◊ Perfectly compatible with virtually all software applications

Guaranteed Lowest Price!

OKI OK!

$479

9-PIN

ML-320/321	300cps	319/459.00
ML-520/521	auto form sensing	388/519.00
ML-3410	Fast 550cps! 8-part forms	1288.00

24-PIN

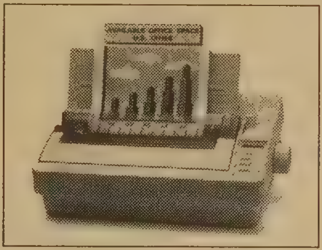
ML-380	192cps, 63cps	229.00
NL-590/591	auto form sensing	469/599.00
ML-395	NEW! Fast 607cps 5-part Forms	988.00

Citizen

CITIZEN™

119

200GX Printer



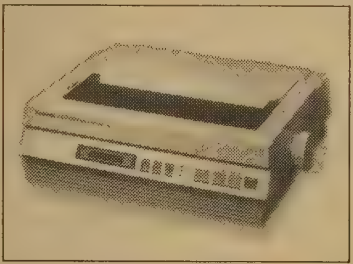
Color Option 39.00

- ◊ 240cps, 9-pin printer
- ◊ 5 built-in fonts
- ◊ Paper parking
- ◊ Fontlocking feature
- ◊ 2 year limited warranty

Panasonic Printers

Panasonic Office Automation OA

** These are factory remanufactured and are fully guaranteed*



KX-P1624

The Most Affordable Wide-Carriage Printer Available!

- ◊ 24-pin
- ◊ 192cps, 63cps LQ
- ◊ 7 built-in fonts
- ◊ 2 year warranty

$249

KX-P1124i

The Most Reliable Heavy Business Printer Available!

- ◊ 24-pin
- ◊ 300cps, 100cps LQ
- ◊ 11 built-in fonts
- ◊ 2 year warranty

$199

KX-P2123

A Quiet Printer Offering a Color Option!

- ◊ 24-pin
- ◊ 240cps, 80cps LQ
- ◊ 6 built-in fonts
- ◊ 2 year warranty

$189

KX-P2180

Affordable Quiet Printer w/ Color Option Capability

- ◊ 9-pin
- ◊ 240cps, 38cps NLQ
- ◊ 6 built-in fonts
- ◊ 2 year warranty

$129

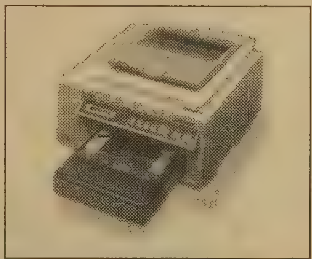
DOT MATRIX PRINTERS

KX-P1150	9-pin, 240cps, 7 fonts	139.00
KX-P1695	9-pin, 330cps wide carriage	389.00
KX-P1624	24-pin wide carriage	379.00

The Quiet Series Printer!
Come Hear the difference! 43.5dBA
2100 Series Color Option $49.95

KX-P2023	24-pin, 240cps, 7 fonts	199.00
KX-P2123	24-pin, 240cps, 6fonts	239.00
KX-P2180	9-pin, 240cps, 6NLQ fonts	169.00
KX-P2624	24-pin, 300cps, 11 fonts	399.00

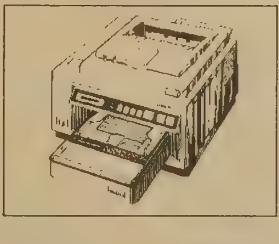
KX-P4430
Laser Printer



- ◊ 5ppms
- ◊ 1MB exp to 5
- ◊ 200 sheet capacity
- ◊ 300dpi resolution

$669

KX-P4410
Laser Printer



- ◊ 5ppm
- ◊ 512K RAM exp to 4.5MB
- ◊ 250 sheet capacity
- ◊ 300dpi resolution

$568

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FREE Printer Stand w/ Dot Matrix

w/ any dot matrix purchase XTP004

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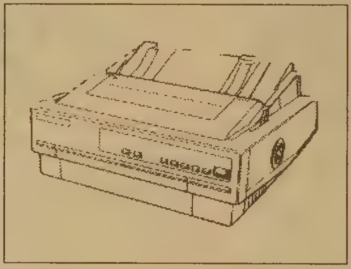
ESC/P2™ EPSON SCALABLE FONTS • ENHANCED GRAPHICS

EPSON®

WHEN YOU'VE GOT AN EPSON, YOU'VE GOT A LOT OF COMPANY™

20% OFF Printer Accessories!

LQ-570+



Faster and with more fonts!

- ◊ 24-pin, 337cps
- ◊ 14 built-in fonts
- ◊ 2 year warranty

$238

AP-2250/3250 9-pin/24-pin 80 column	123/178.00
LX-810 9-pin/80 column	169.00
FX-870/1170	$279/359.00
DFX-5000 9-pin SUPER FAST 530cps	1350.00
DFX-8000 9-pin SUPER FAST 1066cps	2299.00
LQ-870/LQ-1070	469/398.00
LQ-1170	609.00
LQ-2550 400cps	899.00

PCComputing HARDWARE 200 1993 TOP RATED 1993

MAY 1993 BYTE BEST VALUE GRAPHIC ARTS PRINTER

STYLUS 800

Ink Jet Printer

$299

STYLUS 300 Ink Jet $249

- ◊ Fast 150cps
- ◊ Crisp 360dpi laser quality
- ◊ 7 typefaces w/ 4scalable fonts
- ◊ Quiet 45dBA
- ◊ Compact footprint
- ◊ 100-sheet plain paper tray
- ◊ Prints envelopes with ease
- ◊ 2 year warranty

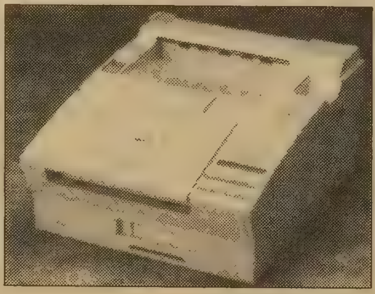
Replacement Ink Cartridge
PTE800C
$19⁹⁵

ActionLaser 1500

Scalable!

- ◊ 6ppm
- ◊ 1MB RAM exp to 5MB
- ◊ 14 resident, 13 scale fonts
- ◊ 1 cartridge slot
- ◊ 150-sheet universal tray
- ◊ HP III/IIIsi, PCL-5 emulation
- ◊ 2 year warranty

$678



Action Laser 1000

- ◊ 6ppm
- ◊ 512K RAM exp to 6.5MB
- ◊ 14tandard fonts
- ◊ 1 cartridge slot
- ◊ 150-sheet universal tray
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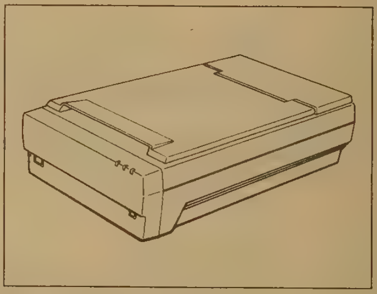

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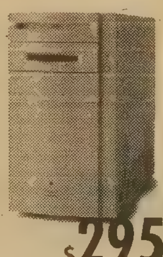

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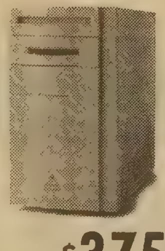

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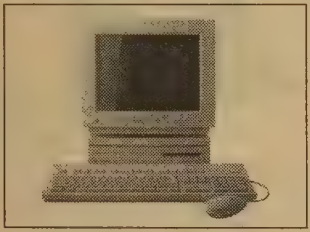

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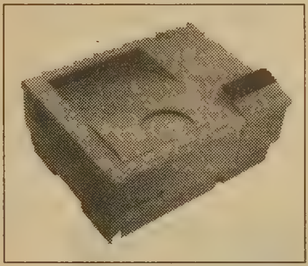

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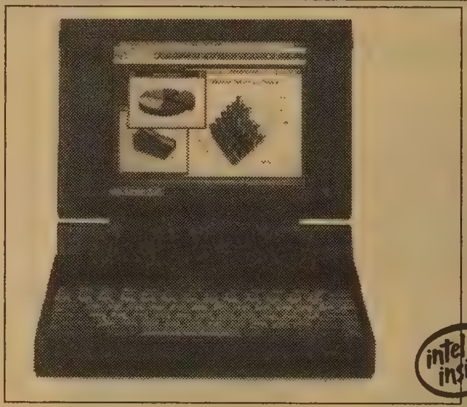

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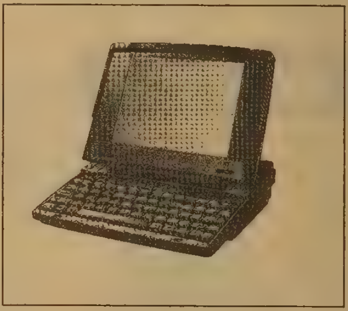

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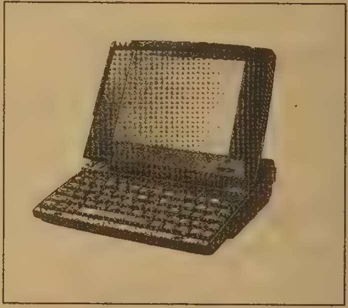

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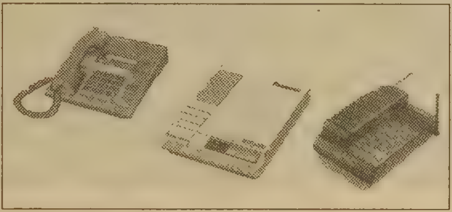

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The Perils Of PC Buying:

The New ADVENTURE! Game

BY MIKAEL BLAISDELL

Many years ago, there was a computer game called Adventure. You sat at your computer terminal and typed in instructions to go this way or that, or to pick up or drop certain items you encountered along the way. You learned to beware of the little dwarf who threw knives at you, or the pirate who stole all of your accumulated treasure. If you stumbled into Wit's End or The Maze ("you're in a maze of twisty passages, all alike"), you cursed and pounded the keys until finally (hopefully) you escaped—or quit the game and went to bed very frustrated.

You are thinking about upgrading your PC. You have the following:

- *Money*
- *Software packages you want to use*
- *Ideas about the performance and quality you want to buy*
- *Fears of appearing uninformed or technologicaly illiterate*
- *A lot of advice and buzzwords you don't really understand*
- *Determination to avoid buying the wrong things*

Time has passed, the computer industry has changed dramatically. But even with all of the industry growth and progress, the confusion and frustration encountered in The Maze has not by any means gone away, for it also has grown along with the industry. The modern version of the ordeal doesn't even require a machine, for it begins the moment you decide to upgrade your system or to buy a new one.

If you are buying multiple systems for your company, or attempting to set purchasing criteria, the challenge may make you think of those late night duels in the electronic dungeon with a certain wistful longing. Those were the good old days.

THE ARENA

PCs are complex pieces of equipment. The internal functioning of both the hardware and software components can be very confusing to the layman. Despite the steep decline in prices over the last five years, and the wide proliferation of PCs, most people are still uncertain as to how to go about evaluating their computing needs against the seeming endless array of bewildering options and choices.

Throughout the business world, millions of people use computers every day for an incredible range of tasks. We know how to use these tools to varying degrees, but when it comes to assessing options and making informed selections based on true quality and performance, we're lost.

The PC evaluation and selection process, like the old Adventure game, also has its sources for help. As you may remember, the game's helper subtracted points for giving its cryptic hints. Similarly, advice and conventional wisdom may be found all around us, but who can we trust? Where can the answers be found? Can you rely on those answers to be accurate? What are the hidden costs?

THE PERILS OF CONVENTIONAL WISDOM

For example, if you announce your intention to buy a new PC, and ask for advice as to what to choose, you're very likely to be given a range of widely varying and often conflicting opinions as to what minimum components to include.

"Ya gotta have at least 8MB of RAM, 250MB of hard disk space, 256K of cache, and it's gotta have a 486DX2-66 CPU." a friend advises. "Well, no, it should have 16MB of RAM and get a Pentium processor," says another, who has been reading the trade press. "Don't buy it now, wait for the clock-tripled CPUs to come out, they run at 99MHz!" cautions your next-door neighbor, who works for a software manufacturer. Over lunch, your coworker also recommends waiting. "Hey, the DEC Alpha's gonna run at 150MHz!" Your friendly local computer store salesman tells you that while 256K external cache is an "absolute" minimum, he can make a special deal just for you and provide 512K worth of cache memory for your new super-system.

There are a variety of hidden perils in the above suggestions, well meaning though they may be. One potential trap is found in the assumption that the CPU speed dictates overall performance. It doesn't, any more than putting a Ferrari engine into your tractor lawn mower will make it into an effective race car. Another trap can be found in the assumption that if your potential computer selection has all of the right components, it will automatically be a "screamer." Not necessarily. For an example of the hidden costs of listening to conventional wisdom, consider the matter of the external memory cache.

THE EXTERNAL CACHE: MORE IS BETTER—BUT FOR WHOM?

In the best of all possible PC designs, according to the engineers, there wouldn't be an external memory cache. Unfortunately, that optimum machine would cost well over $50,000 to build.

As an alternative to building the main memory from those very expensive SRAM

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Mikael Blaisdell is a consultant specializing in customer support issues, as well as a journalist. In addition to MicroTimes, *he writes for* Reseller Management *and is the managing editor of* Sofwin Reports, the Journal of Computing Performance and Productivity. *He may be reached at 3016 Fairview Avenue, Alameda, CA 94501 (510)865-4515 or via email at CompuServe 70365,1246 — AOL: Tao — or by the Internet: tao@WELL.sf.ca.us*

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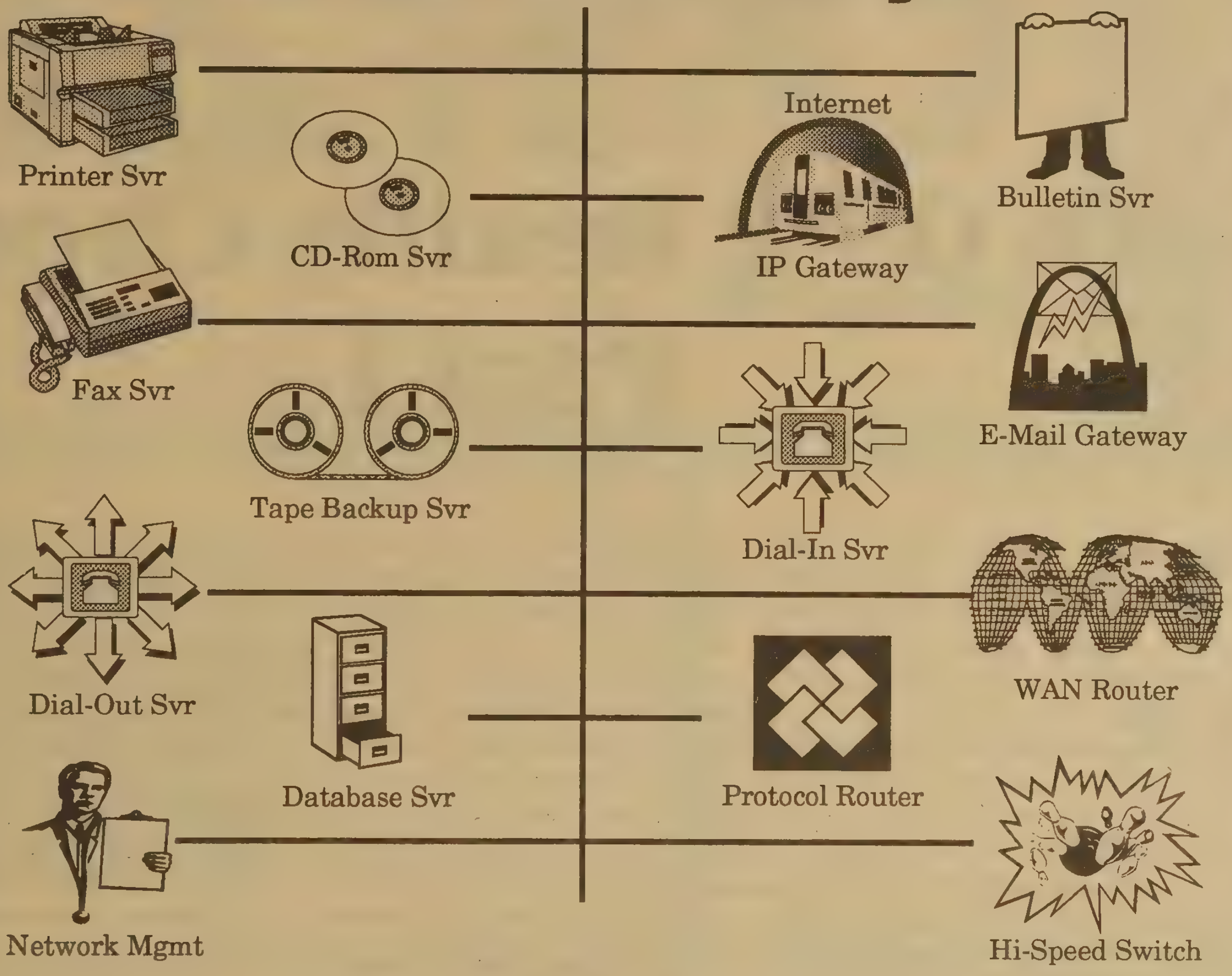
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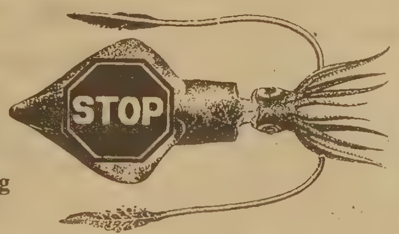

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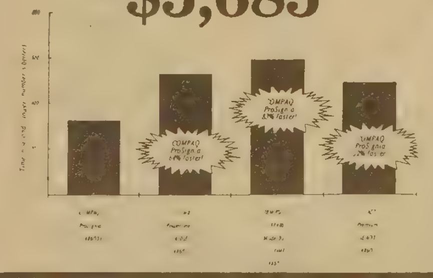

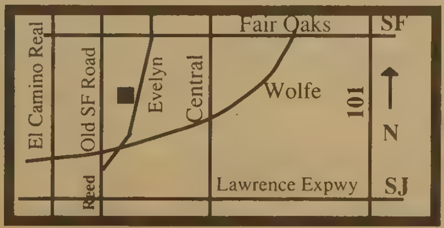
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OS/2:

An OS/2 Reality Check: Part 1

BY FABIAN PASCAL

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Fabian Pascal is a San Francisco independent industry analyst, consultant, educator, and writer specializing in relational database management, OS/2, and office and portable computing. He teaches seminars, consults, and has published extensively. He is author of SQL And Relational Basics (M&T Books, 1990) and Understanding Relational Databases (John Wiley, 1993).

Industry hype of OO and GUI notwithstanding, the real benefits from OS/2 are true multiprocessing (also referred to as preemptive, and not to be confused with multiprocessor computers) and multithreading.

Multiprocessing lets users simultaneously run multiple applications that are protected from each other: e.g. one application can download email from CompuServe in the background, while you do word processing in the foreground, and if one fails none of the other active applications is affected (running on top of DOS, Windows only simulates this capability, and does not provide the same protection).

Multithreading permits an application to perform multiple tasks simultaneously; e.g. a presentation program where you can modify one presentation while handouts or transparencies are printed for another (Windows does not offer this capability).

Both features enhance user productivity, but they depend on the amount and quality of available system resources, and on the efficiency with which applications are designed to use them. Moreover, multithreading must be explicitly designed into OS/2 native applications by developers (DOS and Windows applications can be multiprocessed, but cannot multithread). These important facts are glossed over, creating expectations for benefits that do not always materialize, and which can turn users against OS/2.

This article is the first of two documenting a quite common real experience in the OS/2 world. You will not find this kind of information elsewhere in the press.

THE NEED

As an industry analyst and consultant, I teach seminars and give presentations. Over time I grew tired of transparencies: they are inconvenient, hard to maintain and quite expensive, particularly in the long run. PC presentation software makes them obsolete; yet, like many other users, I have resisted progress for three major reasons: lack of time and inclination for the steep learning curve usually associated with presentation software, absence of OS/2 versions of such software, and the expensive laptop/LCD configurations that would be required for OS/2 slide-shows.

But at some point Lotus released an OS/2 version of Freelance Graphics which seemed to at least mitigate the steepness of the learning curve. Since at about the same time I had to develop a new version of my database seminar, here was a good opportunity to bring myself up to date.

> **IF YOU INTEND TO USE OS/2 AS MORE THAN JUST A MULTITASKER FOR DOS AND WINDOWS APPLICATIONS, GET LOTS OF MEMORY**

The concept behind the Freelance presentation module turned out to be right. A variety of sophisticated layouts are preset, letting the user concentrate on content—the text and graphics. Unfortunately, Lotus did not take the concept to its full logical conclusion, at least not yet. With respect to text, the OS/2 version does not have the outline capability of its Windows counterpart. And Freelance provides its own graphics module with which to generate images, which is precisely what I wanted to avoid. What I really wanted was to capture screens from other applications and import them into presentations. But Freelance has very limited—to be polite—import facilities and, in my attempt to work around them, I ran into some nontrivial problems.

THE OPTIONS

I have recently published a book, which I will use as material for the seminar. I wanted the screen presentation to follow it and, therefore, to use the same figures in both. Since the publisher already had the book figures in electronic format, putting them in a format compatible with Freelance's import facility seemed the obvious solution.

The publisher uses Adobe Illustrator on a Mac, while Freelance for OS/2 imports only PM metafiles and greyscale TIFF files (in IBM format, of course). They could not convert to metafiles, so TIFF was the only solution. But there are two problems with the TIFF format: it is not well standardized, and even at low resolutions the file size is considerable. On the latter point, I turned to Lotus for advice on the best resolution possible in Freelance, to avoid files that would either have too low a resolution to be legible, or would be larger than what the maximum displayable resolution would necessitate. They replied as follows:

"There's no hard and fast rule on how resolution is going to affect file size, because it depends so much on the image that's actually being used. For example, an image at 200dpi of a simple line drawing would not balloon greatly when scanned at 300dpi. An image of a complex photograph, however, would greatly increase but I don't know by what factor.

"Go with 300dpi TIFF files if your desired end-result is printout. Higher TIFF resolu-

continued on page 230

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Dual Scan Color	Add $700
TFT Active Color	Add $1600
Ext. Packet 14400 Fax Modem	$185
Battery Pak	$CALL

MULTIMEDIA PRODUCTS

Sound Blaster Pro Deluxe	$115
Speakers Pair	20
CD-ROM Upgrade Kit CD-8	365
CD-ROM Upgrade Kit CD-16	425
Mitsumi CD-ROM	175
Toshiba CD-ROM 3401-B	380

DRIVES

120 MB IDE HDD	$185
170 MB/210 MB IDE HDD	200/210
270 MB/340 MB IDE HDD	260/300
420 MB/540 MB IDE HDD	420/540
Teac 1.2/Epson 1.2 FDD	50
Teac 1.44/Epson 1.44 FDD	45
Colorado 120 MB Tape Back-Up	145
Colorado 250 MB Tape Back-Up	170
Conner 250 MB Tape Back-Up	155
Tape Cartridges	23

CONTROLLERS

ISA IDE 2FD/2HD w/2S/1P/1G	$15
VESA IDE 2FD/2HD w/2S/1P/1G	35
Vitex AT I/O (2S/1P/1G)	12
Promise ISA IDE Cache Controller	100
Promise VESA IDE Cache Controller	150
Adaptec 1542C SCSI Controller	190
Adaptec 1542CK SCSI II Controller	235
Adaptec 2842VLK VESA SCSI Controller	285
Adaptec 2742TK EISA SCSI Controller	380
BusLogic 545S ISA SCSI Controller	215
BusLogic 445S VLB SCSI Controller	245
BusLogic 742A EISA SCSI Controller	275

MODEM & FAXES

On-Line 2400 Modem w/9600 Send Fax	$30
On-Line Fax Modem 9600 Fax/2400 Modem	45
On-Line Fax Modem 14400 Fax/14400 Modem	130
On-Line Pocket Fax Modem 14400 Fax/14400 Modem	185

MONITORS

Eye-Q 14" Amber	$85
Eye-Q 14" VGA Mono	105
14" SVGA 1024x768 .39	190
14" SVGA 1024x768 .28	230
14" SVGA 1024x768 .28 NI	250
15" SVGA 1280x1024 .28 NI	340
17" SVGA 1280x1024 .26 NI	740
ViewSonic 6E SVGA .28 NI	290
ViewSonic 15 1280x1024 .28 NI	465
ViewSonic 17 1280x1024 .28 NI	985
ViewSonic 20 1600x1280 .28 NI	1625
ViewSonic 21 1600x1280 .29 NI	1860
NEC 3FGe 15" 1024x768 .28 NI	575
NEC 4FGe 15" 1024x768 .28 NI	685
NEC 5FGe 17" 1024x768 .28 NI	1060
NEC 6FG 21" 1280x1024 .28 NI	2280

VIDEO CARDS

Monographic Card	$15
VGA w/256K	30
SVGA w/1 MB ISA	65
Cirrus Logic SVGA VLB w/1 MB	90
Diamond Stealth 24 VLB w/1 MB	155
Diamond Stealth Pro VLB w/1 MB	255
Diamond Stealth Pro VLB w/2 MB	325
Diamond Viper VLB w/2 MB	375
#9 Level 10 ISA w/1 MB	250
#9 Level 11 ISA or VLB w/2 MB	360
#9 Level 12 ISA or VLB w/3 MB	415
Orchid Fahrenheit 1280 Plus w/1 MB	140
Orchid Fahrenheit VLB w/1 MB	145
Orchid Fahrenheit VA ISA w/1 MB	165
Orchid Fahrenheit VA VLB w/1 MB	175
Orchid P9000 VLB w/3 MB	350

MISC.

IBM 486-SLC II 75/99 Motherboard	$CALL
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PCI 486 Motherboard	CALL
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PSII 230W Power Supply	35
XT 150W/UL Power Supply	35
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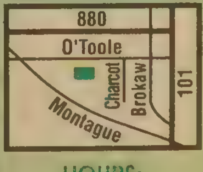

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AIR 486 ISA VLB - SH-Line

Advanced Integration Research, Inc.

READY TO GO

- [illegible]
- [illegible]
- [illegible]
- [illegible] Western Digital [illegible] Cache Harddrive
- [illegible] IDE Controller
  - with [illegible]
- [illegible] VLB 1MB Windows Accelerator
- [illegible] 1024X768NI 0.28DP Monitor
- Premium Mini Tower 200W PS
- 101 Keytronic Keyboard

33SX-$1294 50DX/2-$1479
33DX-$1444 66DX/2-$1615
40DX-$1464

Call For Green Option!

7 bus-mastering slots with 3 VLB extensions, memory upgradeable to 32MB, ZIF socket for easy CPU insertion & removal and future P5 Overdrive support, U.S. made quality motherboard, 2.88M future floppy drive and hi-speed 16550 UART on COM1 & COM2 for smooth serial port transmission. You can pay ordinary price, but you can't get this in-ordinary system anywhere!

AIR P5 ISA VLB - MI-Line

Advanced Integration Research, Inc.

- [illegible]
  - with [illegible]
- [illegible]
- [illegible] Floppy Drives
- [illegible] IDE Western Digital 128K Cache Harddrive
- Toshiba XM-3401B SCSI-2 256K CD-ROM
- Media Vision ProAudio Studio Sound Card
- Diamond Stealth Pro VLB 1MB S3-928 ChipSet
- KFC 17" 1280X1024NI 0.28DP Multisync Digital Monitor
- Premium Full Tower 250W PS
- 101 Keytronic Keyboard

Pentium 60MHz

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P5 comes! For those of you who need ultimate PC power, this is the choice. 512K secondary level 15NS Cache, VLB IDE, FD and I/O built-in. 16MB, 540MB 128K cache! And a perfect matched Diamond Stealth Pro VLB and the 17" Full Screen Digital Controlled KFC monitor. Ready for any graphic/scientisfic intensive work!

AIR 486 ISA VLB - MIS-Line

Advanced Integration Research, Inc.

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  - w/ Integrated VLB-SCSI-2, VLB-IDE, I/O
- 8MB 70ns 72Pin SIMM RAM
- 1.2M & 1.44M TEAC Floppy Drives
- 420MB IDE Western Digital 128K Cache Harddrive
- Toshiba XM-3401B SCSI-2 256K CD-ROM
- Diamond Viper VLB 2MB Weitek 9000 ChipSet
- 15" KFC 1280x1024NI Multisync Digital Monitor
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- 101 Keytronic Keyboard

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- 1.0GB Toshiba SCSI-2 MK-537FBS Cache Harddrive
- Toshiba XM-3401B SCSI-2 256K CD-ROM
- Diamond Viper VLB 2MB VRAM Weitek 9000 ChipSet
- KFC 17" 1280x1024NI Multisync Digital Monitor
- Premium Full Tower 250W PS
- 101 Keytronic Keyboard

33SX-$3694 50DX/2-$3879
33DX-$3844 66DX/2-$4015
40DX-$3864

8 full EISA bus-mastering slots with 3 VLB extension, memory upgradeable to 256MB using 72Pin SIMM, ZIF socket for easy CPU insertion & removal and future P5 Overdrive support, U.S. made quality motherboard. Compare this to AMI or Micronics and you see no reason to spend five hundred dollars for just the name! We add Viper VLB to make this machine fly a step higher!

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004	MS BOOKSHELF	$36
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010	BARNEY BEAR GOES TO SPACE	$17
011	BEAUTY & BEAST	$17
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016	PLAYING W/ LANGUAGES - ENGLISH	$22
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019	MAYO CLINIC FAMILY HEALTH BK	$23
020	NATIONAL GEOGRAPHIC MAMMALS	$22
021	REFERENCE LIBRARY BY STW	$21
022	CHESSMASTER 3000 MPC	$16
023	KINGS QUEST V	$14
024	SPACE QUEST IV	$16
025	STELLAR SEVEN	$17
026	ALL BEAUTIES	$23
028	GIRLS OF VIVID VOL. 1.0	$39
029	GIRLS OF VIVID VOL. 2.0	$39
032	ADVENTURE OF WILLY BEAMISH	$17
033	AIRCRAFT ENCYCLOPEDIA	$29
034	AMER BUSINESS PHONEBOOK 1992	$17
035	AMERICAN VISTA	$29
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040	ARIS WIZARD TEST AND TUNE UP	$18
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043	AUDUBON MAMMALS	$18
044	BARNEY BEAR GOES TO SCHOOL	$17
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060	COMPLETE BOOK SHOP	$18
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063	COREL ARTSHOW 3	$61
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067	DINOSAUR ADVENTURE	$22
068	EDUCATION MASTER	$22
069	ELECTRONIC LIB OF ART VI	$26
071	COREL DRAW V4.0	$259
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075	FAMILY DOCTOR MPC	$19
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089	KGB WORLD FACT BOOK	$32
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109	OS/2 ARCHIVES	$17
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158	VGA SPECTRUM SOUND LIBRARY	$16
159	WIZ-PAK SHAREWARE	$15
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164	WORLD VISTA	$28
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206	DR. GAMES VOL.1	$15
207	DR. MUSIC VOL.1	$15
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209	DR. WINDOWS SHAREWARE VOL.1	$15
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I was impressed and appreciated their technical expertise. This is the only "technically sound" PC store! Remember, selling a PC is not like selling eggs in supermarket, knowing what they are selling counts! Afterall, who else can answer questions like:"co-existence of IDE and SCSI," difference between DX and DX/2," VESA mode and VESA LOCAL BUS." Nobody beats them in BayArea, nobody! Fred Amezcua, San Carlo

You can buy a cheap PC anywhere! But if you want to buy a low cost, best value PC, this is the only choice. They are the true technology leader, combining state of electronic arts the best cost-effective way. Don't even think about Circuit-XXXX, CostXX, Radio ShaXX, or anywhere else! J. D. Besaw, Berkeley

I have been to at least 20 PC stores for shopping my ten gram PC, this is the only store that gave all my answers and impressed me by how well they organize, how much they know what they are selling! And of course, I bought from them. Keith Gould, San Jose

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486 ISA VLB

READY TO GO

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- 1.2M & 1.44M Teac Floppy Drives
- 213MB IDE Western Digital 64K Cache Harddrive
- Promise DC2000 32Bit VLB IDE Controller with 2S/1F
- Cirrus Logic VLB 1MB Windows Accelerator
- 14" 1024X768I 0.28DP Monitor
- Premium Mini Tower 230W PS
- 101 Key Enhanced Keyboard

33SX-$1111
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40DX-$1281
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66DX/2-$1432

Don't just blindly look for lowest price! It makes no sense to buy an VLB system without harddisk controller and video card on VLB. You aren't taking the advantage on the VLB! Be careful, from time to time, you would see ads selling cheap VLB without real controller and video card. Don't take the bait! Or you end up losing money to upgrade.

Components/Upgrades

[illegible]

Motherboard without CPU (Call for CPU Prices)

386/486 ISA 128K - 386/486 CPU support	$100
486 ISA VLB 256K - 3 VLB slots P24T support	$110
486 AIR-SH Green ISA VLB 256K - 3 VLB slots Upto 32MB, ZIF, P24T support, bus-master	$160
486 AIR-UL ISA VLB 256K - 3 VLB slots, upto 50MHz Upto 64MB, ZIF, P24T support, bus-master	$160
Memory Expansion Card 32MB for AIR-UL	$90
486 AIR-MIS ISA VLB - Bus-master, w/ VLB IDE, FD, 2S/1P & VLB SCSI-2 w/ Adaptec 6360 chpset, Upto 64MB by 72Pin SIMM, ZIF, P24T support (256K/512K)	$325/405
Optional Flash BIOS for AIR-MIS	$35
486 AIR-EI Full EISA VLB - 3 VLB Slots, upto 50MHz, Upto 256MB by 72Pin SIMM, ZIF, P24T support, 8 EISA slots w/ 3 VLB extension(256/512K)	$340/420
586 AIR-MI Pentium VLB - 3 VLB Slots, bus-mastering, upto 256MB by 72Pin SIMM, 60/66MHz selectable w/ VLB IDE, FD, 2S/1P, (256K/512K) 15NS	$625/725
Optional Flash BIOS for AIR-MI	$35
486 Orchid VLB SuperBoard 256K 2 VLB slots, bus-master	$180
386/486 Diamond FastBus VLB 256K - uses 72Pin SIMM onbrd IDE I/O, 2 VLB slots, ZIF, Bus-master	$320
486 Micronics ISA VLB JX-30 256K w/ CPU, VLB IDE, I/O 486-33DX/50DX2/66DX2	$700/780/885
486 Micronics EISA VLB 256K w/ CPU - Top of the line! 486-33DX/50DX2/66DX2	$870/950/1160

CPU & Memory: (Please Call, Subject to Change Daily!)

Pentium P5-60MHz/66MHz CPU	$Call
Intel 486-33SX/33DX/50DX2/50DX/66DX2	$Call
AMD 486-40DX/50DX2/66DX2	$Call
8Kx8/32Kx8 Cache Memory	$2/$5
1MB DRAM (44256-70ns DRAMx8pcs)	$40
1MB VRAM (44256-70ns VRAMx8pcs)	$60
1MB RAM (256K-70ns SIMMx4pcs)	$Call
4MB RAM (1M-70ns SIMMx4pcs)	$Call
16MB RAM (4M-70ns SIMMx4pcs)	$Call
72Pin 70ns SIMM (4/8/16/32MB)	$175/350/640/1350

[illegible]

Single/Dual Printer Card	$10/15
AT I/O 2S/1P/1G	$12
AT I/O 2S/1P/1G w/ 2 HiSpd UART 16550's	$45
4 Serial Port Card with Cable	$65
16Bit IDE 2FD/2HD Controller	$12
16Bit IDE 2FD/2HD with 2S/1P/1G	$14
16Bit IDE 4FD/2HD 2.88MB support	$29
16Bit IDE 4FD/2HD 2S/1P 2.88MB support	$49
IDE Caching Controller Upto 64MB, 2HD/4FD	$75
Promise DC-2000 VLB IDE w/ I/O	$35
VLB IDE 2FD/2HD with I/O Support 2.88MB, with 2 HiSpd UART 16550's, 1 Parallel	$75
Promise DC-4030VL VLB IDE w/ 0MB Cache	$130
UltraStor 34F SCSI-2 VLB Bus-Mastering	$265
UltraStor Software Driver Kit for 34F	$45
BusLogic BT445S VLB SCSI-2, Bus-Mastering w/ Floppy Ctrl & Driver Kit	$265
Adaptec 1522A SCSI Controller	$80
Adaptec 1522 SCSI Controller w/ Kit	$140
Adaptec 1542CF Bus-master SCSI Cntrllr w/ Kit	$240
Adaptec 2742T EISA RISC-based SCSI-2 Controller w/ Dual Channel supporting 14 HDs, 2.88M	$385
Adaptec 2842VL VLB-to-Fast SCSI-2 Controller w/ 2.88MB Support & Driver Kit	$305
AIR QAccess Fast SCSI-2 VLB Controller w/ Adaptec 6360 Chipset and EZ-SCSI Softwre w/ VLB IDE/FD and 2S/1P/1G	$145 Only!
External SCSI-2 Adapter for QAccess	$40
AIR VLB 32Bit NE-2000 Ethernet Adapter	$250
Ethernet NE2000 Adapter Coaxial	$48

Video Card:

Monochrome Graphic Printer Card	$12
16Bit 512K/1MB Trident SVGA 1024x768	$45/67
16Bit 1MB Tseng-4000 72Hz 32K Color	$75
Tseng-ET4000/4000-W32 VLB 1MB 16.7M Color	$100/125
Cirrus Logic VLB 1MB/2MB	$95/135
SPiDER Cirrus Logic VLB 1MB/2MB	$95/135
SPiDER Cirrus Logic VLB Plus 1MB/2MB	$120/160
SPiDER Black Widow VLB 1MB/2MB	$205/265
Orchid Fahrenheit 1280 PLUS VLB 1MB/2MB	$165/205
Orchid Fahrenheit VA VLB 1/2MB	$175/215
Orchid Celsius VLB 1MB/2MB	$215/275
Diamond Speedstar Pro VLB 1MB	$110
Diamond Stealth 24 VLB 1MB DRAM S3-805	$155
Diamond Stealth Pro VLB 1/2MB VRAM S3-928	$255/315
Diamond Viper VLB 2MB VRAM 44M Wnmrks	$365
ATI Ultra Pro VLB 2MB VRAM 30M Wnmrks	$365

Monitor:

14" Monochrome Monitor	$90
Impression 14" 1024x768x0.39DP	$205
Impression 14" 1024x768x0.28DP	$245
Impression 14" 1024x768NIx0.28DP	$265
Impression 17" 1280x1024x0.26DP (Mag 17F OEM)	$865
KFC 14" 1024x768x0.28DP	$245
KFC 14" 1024x768NIx0.28DP	$265
KFC 14" Multisync, 1024x768NIx0.28DP Digital-Control,Non-Glared	$355
KFC 15" Multisync,1280x1024NIx0.28DP Digital-Control,Non-Glared,Flat-Screen	$420
KFC 17" Multisync,1280x1024NIx0.26DP Digital-Control,Non-Glared,Flat-Screen	$770
MAG 15F Low-Rad 15" 0.28DP, 1280x1024NI	$495
MAG 17F Low-Rad 17" 0.26DP, 1280x1024NI	$925
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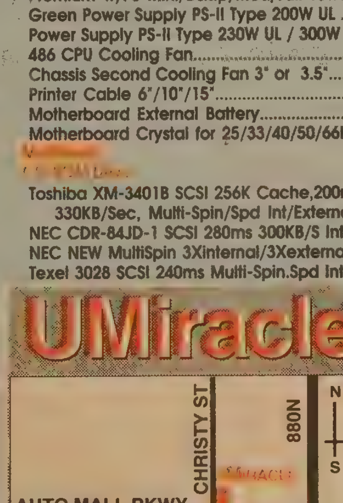

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Predictions For 1994

BY DAVID MORGENSTERN

This month's column brings our annual roundup of predictions from the BMUG braintrust. Members of our psychic friends network haul out their fortune-telling stacks and look into the year ahead. If some seem overly technical, just clip out the column, write "we'll just see" in the margin, and post it by your desk at the office. Everyone will think you're an egghead. Here are the results:

• BERNARD ABOBA, AUTHOR OF THE BMUG GUIDE TO BULLETIN BOARDS AND BEYOND

Last year, one of my predictions finally came true, but only after I had given up believing it would happen—NeXT became a software company. After prophesying the demise of NeXT hardware for nearly half a decade, last year I gave up, and purchased a used NeXTStation (which I love). Seven days later, NeXT made the fateful announcement that they were dropping their hardware.

Sometime in the next year the Internet will pass four million hosts and, assuming ten people per host, may have as many as forty million users. Half of them will be pitted against the other half in a huge flame war on USENET, which will be known as the first USENET World War. To get prepared for this inevitable conflagration, you should start perfecting your insults ahead of time.

We're forming a betting league on what will touch off the World War. My bet: A debate on the PowerPC versus the Pentium.

1994 will also see the first extensive use of electronic mail in congressional campaigns. Of course, this will lead to the first email smear campaign. In the new eworld, the sound bite will be replaced by the multimedia byte, thirty-second-long multimedia campaign pitches put out by candidates over the net. Many politically naive net-weenies will decide on who to vote for by which campaign's QuickTime pitch is slicker.

I also predict that virtually none of the benefits trumpeted by the merger of Telcos and Cable companies will materialize in the near future. Interactive TV, where available, will flop; providers offering large numbers of channels (though not near the promised 500) will find their viewing audience so badly fragmented that advertising revenue will suffer. Also, a dearth of decent programming will prevent any real diversity from appearing in the medium.

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• SCOTT BEAMER, LONGTIME BMUGER, JOURNALIST AND AUTHOR OF FORTHCOMING BOOK, WHAT TO DO WITH YOUR OLD MAC

Apple will release considerably fewer models than last year. In 1993, Apple released thirty new models, almost as many as in the prior nine years of the Mac's existence combined. The goal was to gain shelf space in stores where multiple computer brands are sold.

There will be still more price cuts, with consumers being offered really surprisingly low prices for both hardware and software. Last year, Apple got rid of surplus inventory in new and creative ways. BMUG participated in a couple of specials offered through user groups. You got a 13-inch color monitor; a 68030 CPU with 4 MB of RAM; an 80MB hard disk; complete with mouse, keyboard, and bundled software (including ClarisWorks) for about $850 in the best deal. Most of the models offered through this channel were about $500 under the street price. Join your friendly local user group (or BMUG, since not all groups were invited by Apple to participate) and stay in touch if you would like a bargain-priced Mac.

As people begin to wait for the right Power PC model, rather than buy today's Mac, expect to see Apple come up with some very attractive offers to lure customers to buy now.

Great deals of software abounded, and next year should be even better. While the big guns in the software industry, engaged in tacit conspiracy, set the standard price for a word processor or spreadsheet at $495, careful users paid around $100 for the product of their choice. Best deal of the year goes to WordPerfect. They offered a disk only (no manuals) upgrade of WordPerfect 3.0 for $24.95.

Don't throw away any of your old software disks or manuals. They may be all you need to qualify for the great competitive upgrades you will see all year. Look for Microsoft to push Mac users to buy MS Office 2.0, rather than individual copies of Word 6.0 or Excel 5.0. Upgrades will begin about $260, but look for some attractive sidegrade prices.

MS Office Pro will not come out for Macintosh in 1994. MS Office Pro is the same as MS Office 2.0, except that it's scheduled to include Access, a database with relational pretensions. But Access is too lame to attract customers. Microsoft is still having trouble getting Visual Basic for Macintosh out the door.

I predict that the introduction of the Power PC will be as much a pain and embarrassment to Apple as was the intro of the Newton. The Newton will continue to show promise all year long, but not sales.

Color printing will finally come of age among "the rest of us" Mac users. Have you noticed? The last year or so, most long-term users of black-and-white all-in-one Macs have migrated to LCs and Performas. Apple no longer sells black-and-white models of Macs, only grayscale, which are all color capable.

The real thing holding back color printing has been the availability of low-cost, high-quality color printing. While the color laser printer now exists, its price was still around $10,000 at last check. However, those wanting 300dpi with color output, have got to be impressed by the new Hewlett-Packard DeskWriter 310, priced at $299. NEC has a similar model.

Boosting the acceptance and use of color printing by the rest of us will be great new software like ClarisImpact which will allow the casual user to turn out impressive color documents with only a few minutes effort.

• STEPHEN HOWARD, BMUG BOARD MEMBER AND MACWEEK EDITOR

Apple will sell about 400,000 PowerPC Macs in 1994, beyond all industry analysts' predictions.

PowerBook owners will start feeling second-rate in '94 as desktop Macs move to RISC but portables don't. Even an '040-based PB won't feel fast next to an 80MHz PowerPC 601.

The AV Macs will be the hardware HyperCard. They will get lots of use, but no one will be able to say why. People will scream over the cost to upgrade PowerPC

Macs to AV capabilities.

Microsoft will be months late with PowerPC-native versions of Word and Excel.

Two extreme attitudes in the popular press toward telecommunications—"BBSes are all about online sex" and the "Internet is great!" will collide. In many publications, articles will appear that detail the niche depravity, widespread anarchy, and general uselessness of Internet newsgroups. Related tips: the technical press will start writing about how the Internet's basic addressing scheme has reached its limits—causing untold pain and suffering among the new recruits—and how Mosaic is not nearly as good as we all thought.

Some smart Washington legislator will ask the attention-getting question, "What constitutes 'dumping' in the software market?"

The anti-Baby Bell legions will sit around bars, staring at the walls, wondering if they were deeply, deeply wrong as the private sector they opposed freeing throws billions into nationwide optical networks.

Sacramento-weary Jim Warren will run screaming from the room every time someone mentions free digital access to public records.

The Newton-based phones will be really cool. People won't be inclined to write very much on them, and someone will make call-management and voice mail interfaces that finally will attract complete novices.

• DAVID MORGENSTERN, BMUG CHEERLEADER

The upcoming year's news will be dominated by new Newton implementations. Expect to see some models that will be wildly successful and others not so. There will even be some moments of Newtonian scandal.

Apple stockholders will revolt when it's discovered that hundreds of thousands of dollars have been sunk into an Advanced Technology Group skunkwork scheme to bring Newton's object-oriented software abilities to barnyard animals. The Pig Newton project is based on a beer-to-beer networking model of animal to human interaction (beer being used as a reward for an animal's correct use of a special shock-resistant hardware device).

The research hoped to improve farm productivity by providing a means for small -sized animals to contribute information normally unavailable to farmers. A combination graphic and olfactory interface was developed by the Inhuman Interface Team. Unfortunately, some of the dogs, geese, and kangaroos (at the Australian site) using the Pig Newton became more interested in the pawtop itself, rather than reporting news from around the test site. However, the hacker animals were able to provide all the in-house software support for the farm.

The PowerPC will bring extra punch to graphic applications. PaperMoney Designer will enable users to mix and match features from 135 international currencies. The program is configured to automatically notify federal authorities in the event that users chance on any exact combinations, but a code-patch is immediately hacked and posted on the Net. Although the use of the product will be decried by the US Treasury Department, the software will boost color printer sales by 200%. Not until its use adversely affects the nation's inflation rate and international monetary policy will its use be prohibited. Plans for a postal version will be scrapped.

•FRED SWAN, BMUG BOARD MEMBER AND SONY HARDWARE GUY

A multitude of exciting new removable media drives will be introduced. Some will have special multimedia capabilities, others will simply be larger in capacity or higher speed. 1.3GB will be the new standard for 5.25" optical drives. There will be a wide variety of other drives in form factors from 3.5" down to 1.8". The hard part will be choosing between them!

Despite the skepticism of many computer pundits, PowerPC Macintosh computers will be wildly successful. Of course, there will the usual delays in initial availability and then excess inventory due to resellers buying too much up front, but in the long run, Apple will set new company records for desktop computer unit sales.

Conservative activists will launch a campaign against "killer apps," citing them as a bad influence on children and caffeine-doped computer nerds. Congress will form a committee to study the issue.

There will continue to be a lot of compression in the "channels." Due to margin pressure and the acceptance of mail order, dealers, manufacturers, VARs and distributors will all be looking to capitalize on each other's markets. Look for more mergers between dealers and distributors.

Politicians will launch a bipartisan effort to support new media, because they're "sick of the old media and Sam Donaldson is too darn pushy."

The Clinton administration's efforts to build a digital information superhighway will be derailed by strong lobbyists from the insurance industry who will insist on a national superhighway speed limit of 2400-baud.

Manufacturers of portable computers will throw up their hands in consternation when they are sued by Ford Motor Company, which will claim to have a patent covering all glass screens used in interfaces for mobile devices.

• BILL WOODCOCK, LONGTIME BMUG NETWORK GURU AND PRIMARY OF ZOCALO ENGINEERING IN BERKELEY

Electronic Democracy will take hold, and Kibo will be elected to public office. *[Kibo is the focus of the first online religion, Kibology. This trailblazing creed has 21,000 adherents, and is reportedly the third largest on the Internet, after Christianity and those identified as "New Age." His full name is James Parry, and he lives in Boston. He's been elected Earth Spokesperson by the subscribers of the alt.alien-visitors Internet newsgroup. If you're on the Net, you might want to check out the many Kibo hangouts.]*

P (Point-to-Point Protocol) will become established as the wide area network protocol of choice, as more vendors support multiple high-level protocols on P links. AppleTalk has now joined IP, and both will be available simultaneously, on the same link, very soon. Expect IPX and DecNet to join them by year's end.

The Internet will begin to carry a wider range of traffic, as more encapsulated and high-level protocols begin crossing it. This will probably manifest itself in at least three areas: more multimedia narrowcasting, like the MBONE network is currently doing; more encrypted corporate traffic linking remote offices, like ANS is currently providing for some of their corporate customers; and more protocol-specific "clouds," that users of protocols like AURP (Apple Update-based Routing Protocol, Apple's encapsulation of AppleTalk-in-IP) can join, to see worldwide native-protocol connectivity to public resources.

WARNING:

UNDER NO CIRCUMSTANCES SHOULD THESE PREDICTIONS BE USED TO INFLUENCE ANY PERSONAL OR BUSINESS PURCHASING DECISIONS. IF YOU DO—TOUGH! WE WARNED YOU.

continued on page 312

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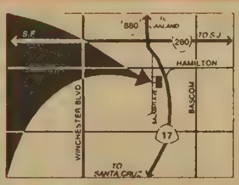
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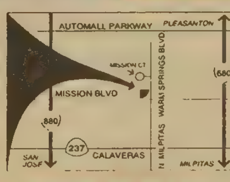
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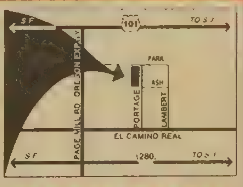
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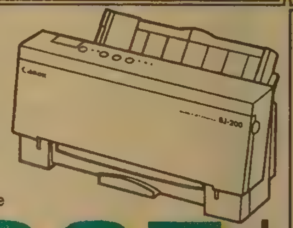

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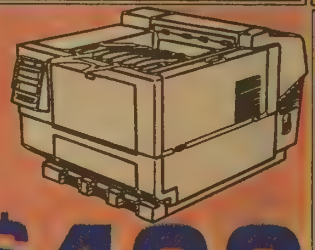

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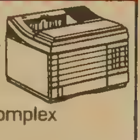

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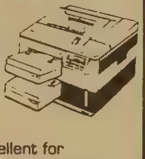

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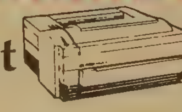

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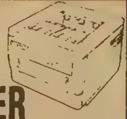

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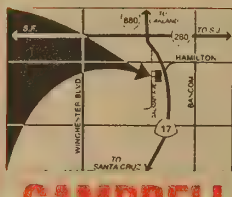

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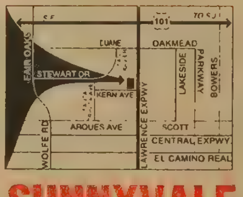

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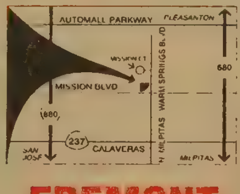

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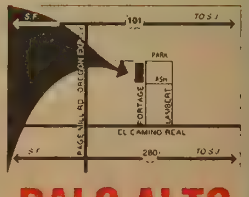

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The Disney Collection Screen Saver will take you to the magical world of Disney with your favorite characters. Includes five classic Disney songs. Features over 15 colorful animated Disney displays. Classic Disney voices and sounds. Runs all After Dark 2.0 displays and more.

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Myst is an adventure game unlike any other, with stunning 3-D photo realistic worlds. Myst is a surrealistic exploration, where every vibrant rock, scrap of paper and sound may hold vital clues to your unraveling a chilling tale of intrigue and deceit.

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Kid Works 2 combines a wordprocessor, point and advanced text-to-speech technology all in one. With the ability to convert text-to-pictures and pictures-to-text, children learn to express their thoughts both visually and in writing.

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The Chessmaster 3000 Turbo incorporates the world champion 32-bit chess engine along with dazzling graphics, and modem and networking capability- raising computerized chess to a new level of excellence!

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Kid Pix is an amazing paint program createc just for kids. It combines special effect art tools, picture stamps, sounds and magic screen transformation to turn the computer into a magical art studio. It has a bunch of goofy brushes that make funny sounds. You can even record greetings, poems and music.

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Give your child Kid Cuts and soon they'll be creating, printing and cutting out all kinds of kid stuff from puzzles and puppets to party hats and paper dolls. Your kids can draw with Wacky Brushes, add great pictures with rubber Stamps, and *presto!* make instant changes with the Magic Wand. And every fun tool comes with its own fun sound. Plus, when your kids are ready to cut out their work, there is a free pair of safety scissors in every box.

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IRON HELIX CD-ROM

Iron Helix is a science fiction thriller that immerses you in a great paced virtual reality filled with danger and intrigue. Control a robot probe or navigate through dozens of corridors and rooms. This CD action adventure game looks and feels more like a movie than a game.

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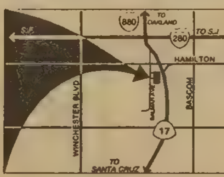

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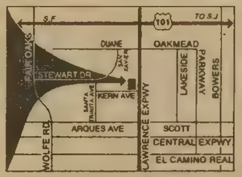

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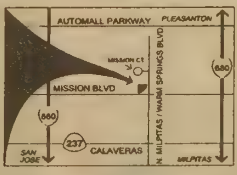

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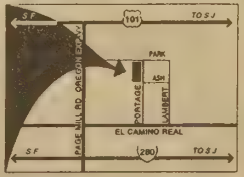

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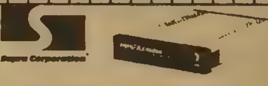

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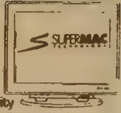

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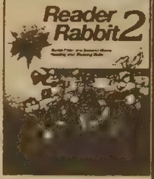
Reader Rabbit 2



The Learning Company
Reader Rabbit 2

Reader Rabbit 2 is designed to motivate first and second grade level children to read on their own as they build a foundation for successful reading. It helps children with:
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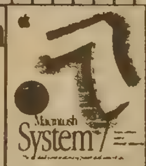
System 7 Pro



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System 7

Apple's award-winning System 7 software now includes three powerful system software enhancements: PowerTalk, AppleScript, and QuickTime. PowerTalk collaboration software makes it easier than ever to exchange electronic mail and documents with others-anytime, anywhere. AppleScript allows you to automate frequently repeated tasks. And QuickTime lets you add "movies" to your presentations and documents.

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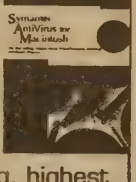

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After Dark provides over 30 different displays to prevent screen burn-in. You can choose any style including lightning bolts, abstract art, crawling worms, a jump-to-light-speed or a basic dimmer.

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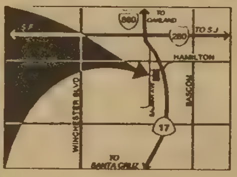

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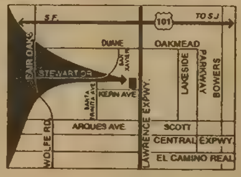

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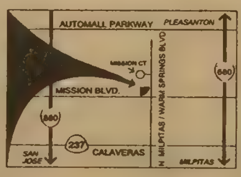

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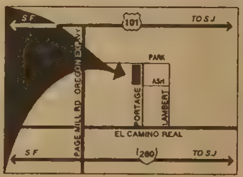

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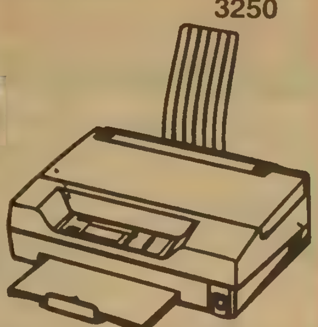

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50 Sheet Paper Cassette Tray • Quiet • ESC/P2 Control Language
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80 Column • 337 CPS Draft Mode
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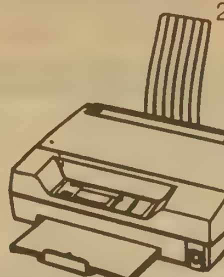

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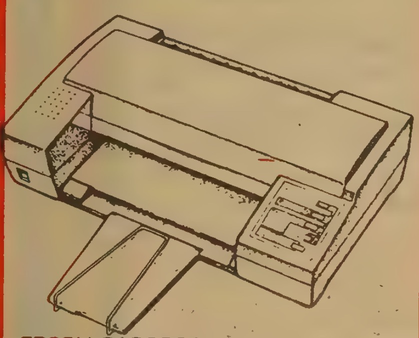

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- ESC/P2 Letter Quality Type Faces with 4 Scalable Fonts

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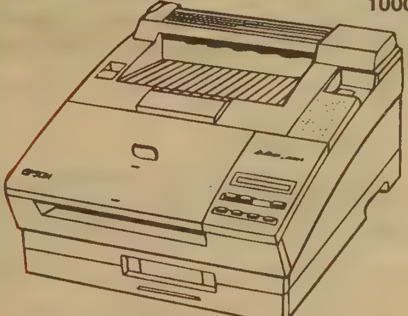

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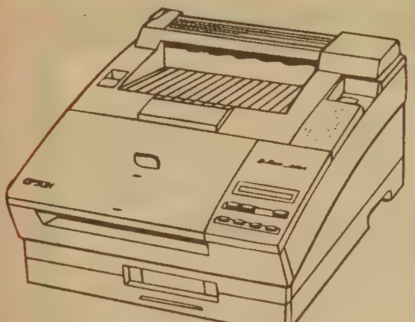

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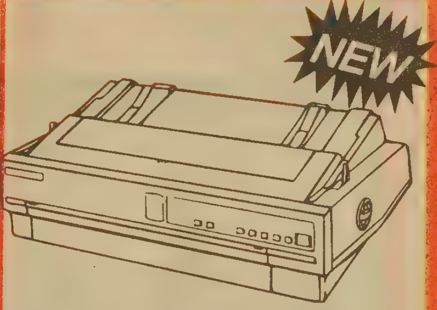

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Mode 84 CPS NLQ Mode
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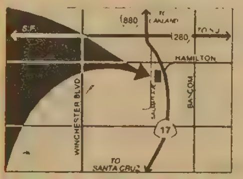
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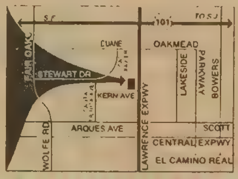
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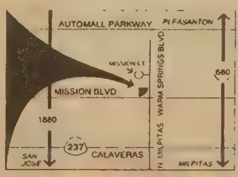
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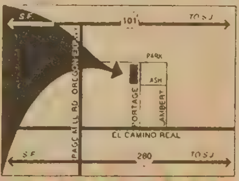
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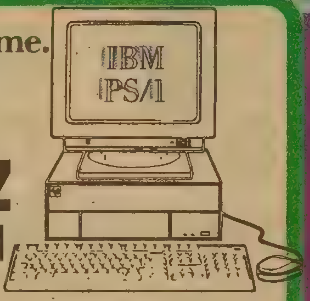

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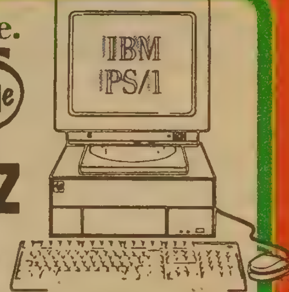

2155-41T

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340MB SVGA SYSTEM

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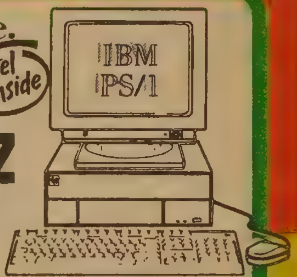

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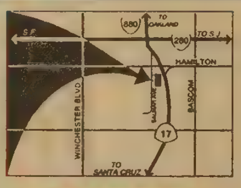
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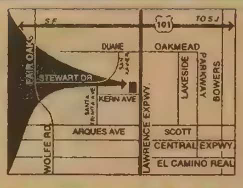
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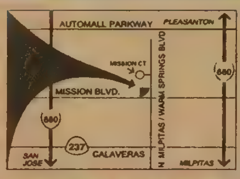
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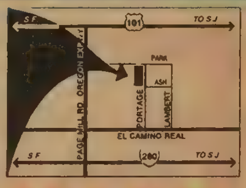
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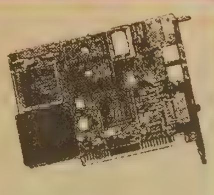

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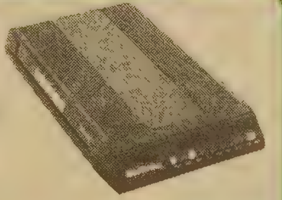

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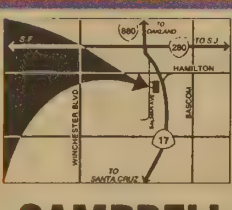
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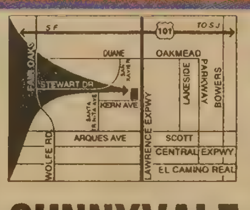
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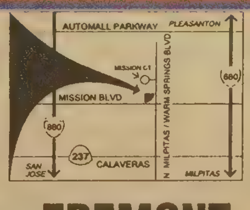
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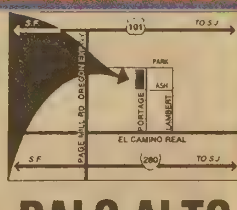
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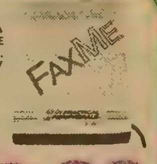

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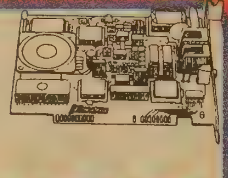

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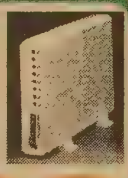

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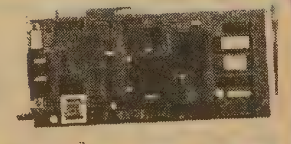

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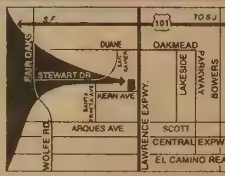

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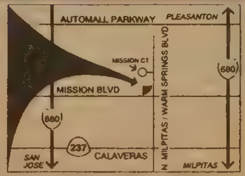

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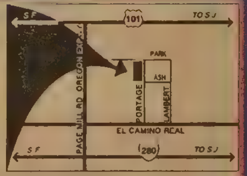

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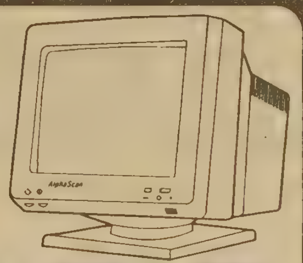

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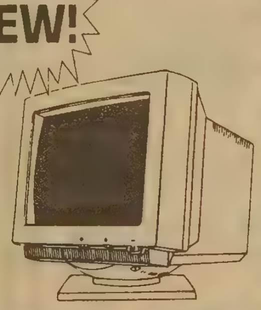

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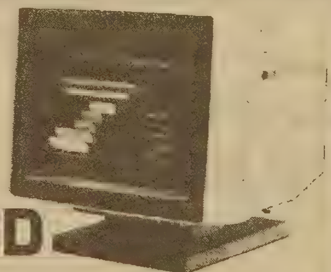

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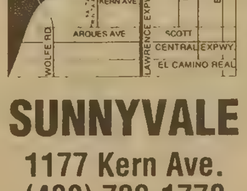

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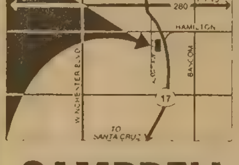
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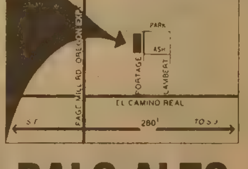
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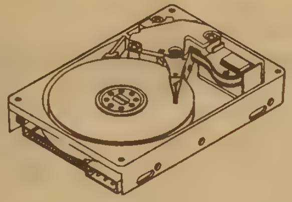
3.5" x 1 #1746658



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SAMSUNG 120MB 3.5" IDE HARD DRIVE **$159**

3.5" Form Factor 1" Ht. • 16ms Average Access Time
SHD3062A #1708695

Seagate

130MB IDE HARD DRIVE

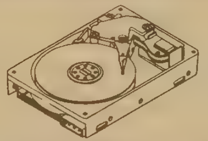
$179

3144A #1660878

Maxtor

131MB 3.5" IDE HARD DRIVE

3.5" X 1" HT • 15MS Access Time 7131A #1803646



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CONNER

170MB 3.5" IDE HARD DRIVE

17ms Average Access • 32K Buffer • 1" Ht. • Low Power Consumption CP30174E #1656815

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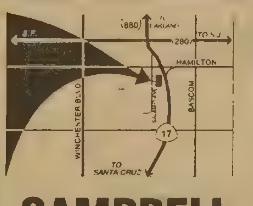
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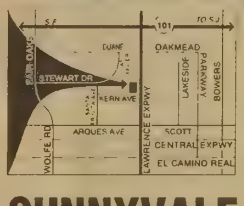
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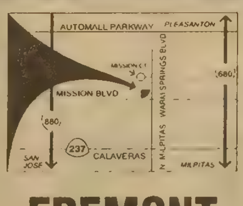
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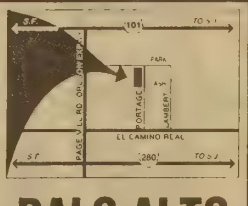
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210MB IDE HARD DRIVE

13 msec Access • 2 Year Warranty
AC1210 #1828522

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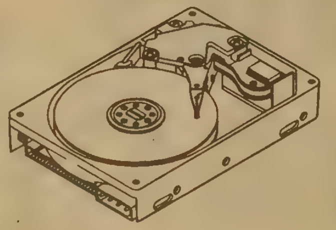

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3.5" Form Factor • 1" Height • 15ms Access 7213A #1694044

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256K CACHE • FAST ACCESS #1758449

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3.5" Form Factor 1" Ht. SHD-3122A #1786011

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CONNER 360MB 3.5" IDE HARD DRIVE

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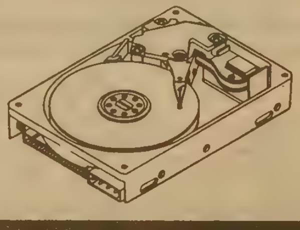
CP3364 #1844823



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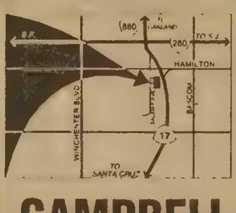
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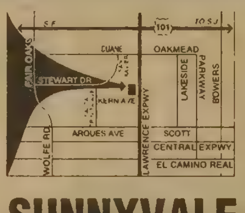
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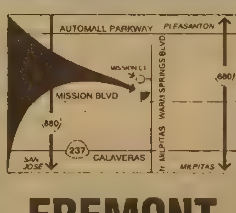
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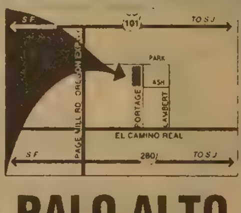
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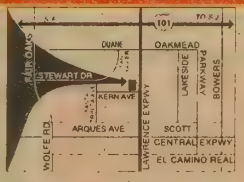
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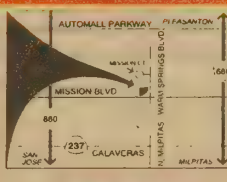
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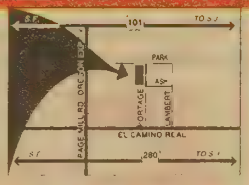
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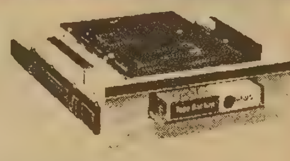

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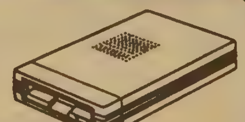

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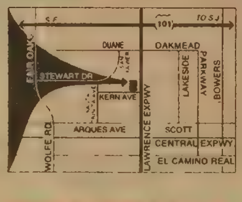
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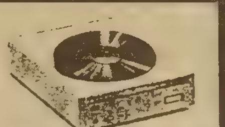

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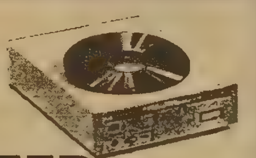

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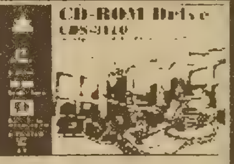

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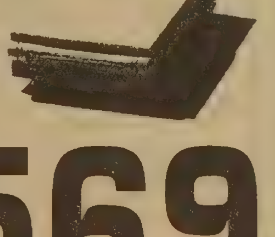

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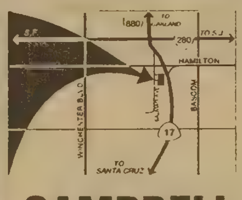

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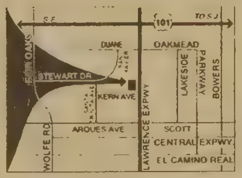

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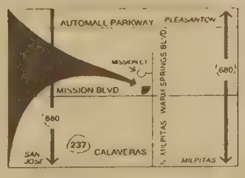

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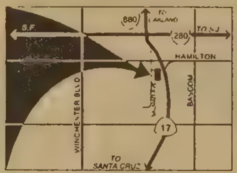
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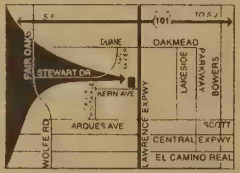
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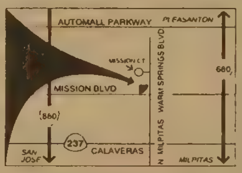
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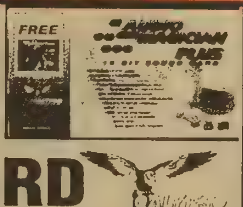

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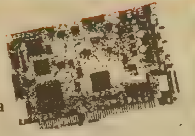

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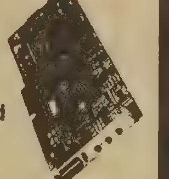

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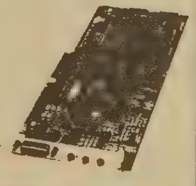

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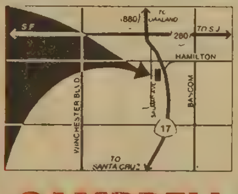

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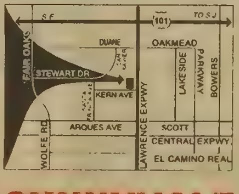

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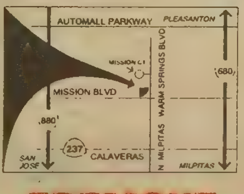

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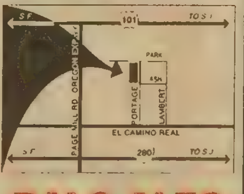

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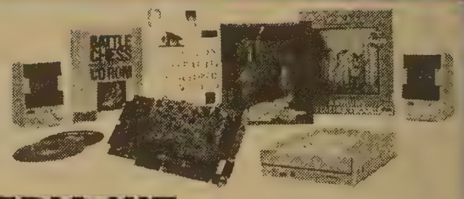
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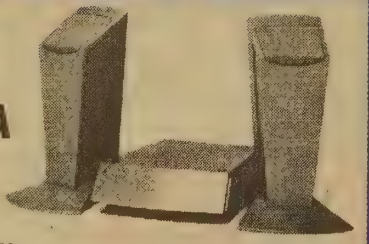

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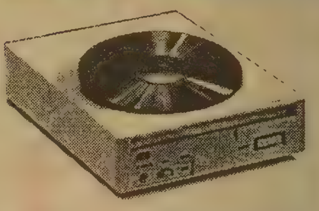

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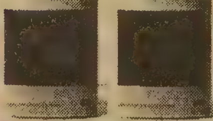

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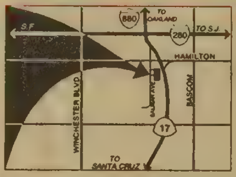
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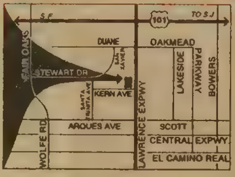
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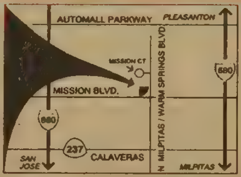
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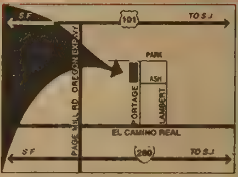
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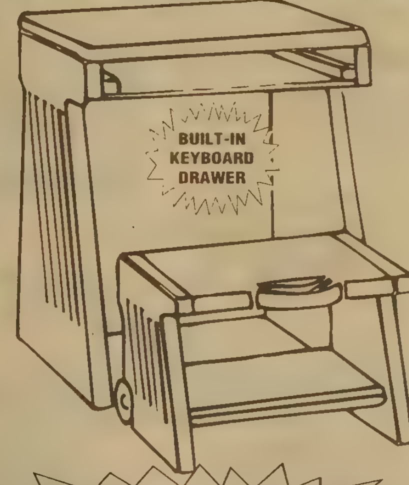

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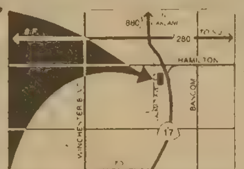

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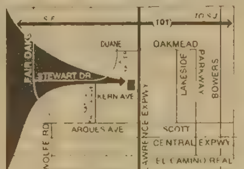

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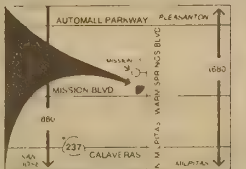

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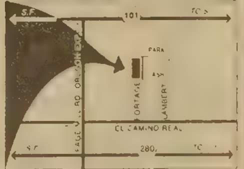

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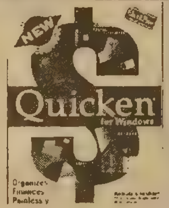
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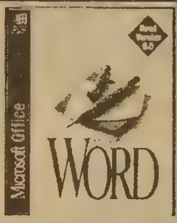
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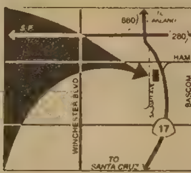
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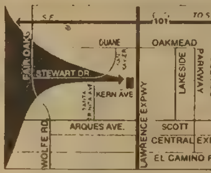
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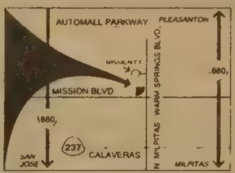
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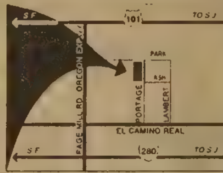
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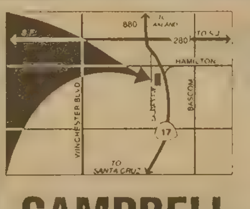

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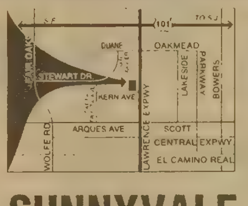

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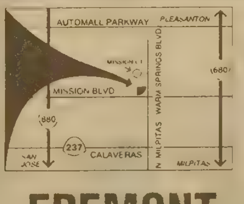

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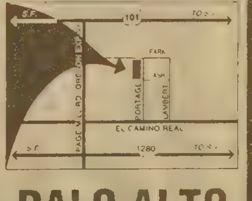

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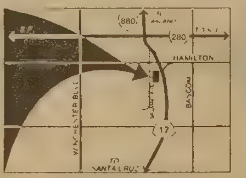

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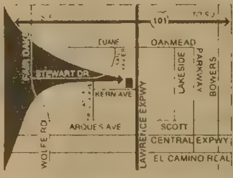

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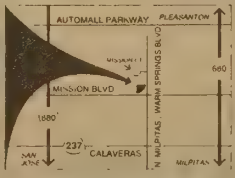

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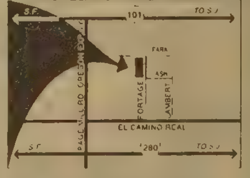

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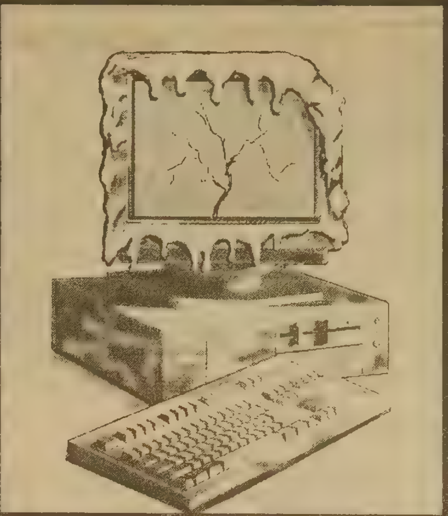

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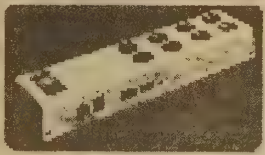

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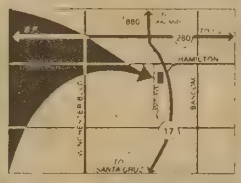
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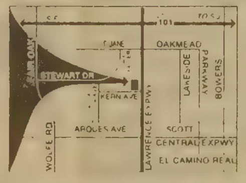
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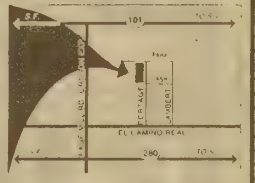
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Digital network includes switching and network transmission only. Unlimited Weekend Calling offer valid December 1 through January 31, 1994. This offer valid only with a one-year agreement on select GTE Mobilnet rate plans. GTE Mobilnet unlimited weekend offer available to retail customers only and on approved credit basis. Charges on toll, roaming, long distance and tax not included. After four weekends of unlimited calling, the weekend calling package will be automatically billed at $15 per month. Unlimited Weekend Calling offer does not require phone purchase. This promotion cannot be combined with any other GTE Mobilnet offers. Contents may not be reproduced without written permission by GTE Mobilnet. All rates and information subject to change without notice. Other restrictions apply. © 1993 GTE Mobilnet.

PACTEL PAGING **MOTOROLA**

LIFESTYLE PAGER

When your lifestyle demands that you be on the move, this Motorola Pager will help you keep important lines of communication open. Its 12-digit LCD display, 6 number memory, and tone or vibrate message alert make this Motorola Pager an invaluable communication and business tool at only...

$59.95

Model
Lifestyle Pager
#1825851

MOTOROLA

CELLULAR TRAVELER PHONE

Motorola's traveler phone combines a compact design with a full 3 watts of power at the incredibly low price of only...

$134.95*

*AFTER $25 INSTANT SERVICE ACTIVATION REBATE

Model S-3230
#1751866

MOTOROLA

TRANSPORTABLE HANDHELD CELLULAR TELEPHONE

Motorola's most popular Hand Held Phone has all the right features! This compact unit will allow you to talk for up to 90 minutes, keep 30 numbers in memory, and much more!

$164.95*

*AFTER $25 INSTANT SERVICE ACTIVATION REBATE.

Model 8000-HX
#1502549

MOTOROLA

CELLULAR FLIP PHONE

This premium value cellular phone from Motorola comes equipped with 30 number memory, LED display, call timer, signal strength meter, a battery with 75 minute total talk time, and an overnight charger for only...

$229.95*

Model
DPC-550
#1635999

*AFTER $25 INSTANT SERVICE ACTIVATION REBATE

MOTOROLA

ALPHA MICRO-TAC CELLULAR PHONE

If it's small and lightweight you're looking for, this is the cellular phone for you! With its 101 alpha numeric memory, a desktop charger, and standard battery, this technologicaly advanced cellular phone can be yours for only...

$358.95*

Model
DPCAC
#1635988

*AFTER $25 INSTANT SERVICE ACTIVATION REBATE

MOTOROLA

MICRO TAC LITE CELLULAR PHONE

Weighing in at 7.7 ounces and measuring 11.6 cubic inches, this is one of the lightest and most advanced cellular telephones available. With 100 alpha numeric memory, retractable antenna, standard battery, and desktop charger, you can receive state of the art performance and design for only...

$464.95*

Model
MICRO
TAC LITE BASE
#1750739

*AFTER $25 INSTANT SERVICE ACTIVATION REBATE

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Prices Good Through February 1, 1994

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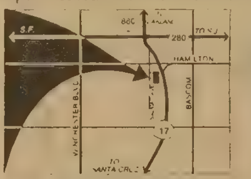
SATURDAY
9AM-8PM
SUNDAY
9AM-7PM

VISA AND MASTERCARD ACCEPTED

*Upon Activation with GTE Cellular Service. **Service Activation Not Required. No Sales To Dealers Or Resellers. Limit One Per Family.



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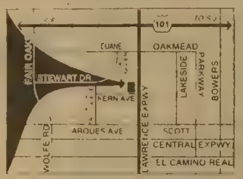

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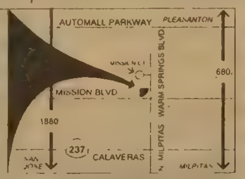

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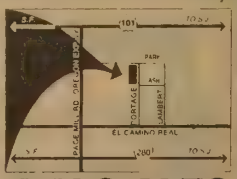

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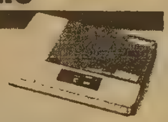
ANSWERING MACHINES

Panasonic



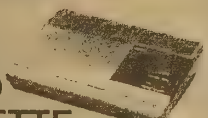
ANSWERING MACHINE

Answering system with Auto-Logic Operation, Tone Remote Control, Digital Display, Message Memo Recording and Remote turn on, Auto-Logic Operation Automatically Rewinds, Plays Messages, Stops at the Last Message and Resets itself at the Touch of One Button.

$37.99

Model
KX-T1000
#1498194

Panasonic



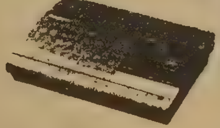
DUAL MICRO CASSETTE ANSWERING SYSTEM

Panasonic's new dual micro cassette answering system offers an LCD Call Counter, marker message, room monitor, auto disconnect, electronic auto disconnect, electronic volume control, audible message alert, and much more for only…

$69.95

MODEL
KX-T2100
#1740208

Panasonic



DUAL MICRO CASSETTE ANSWERING SYSTEM

W/ VOICE TIME/DAY STAMP

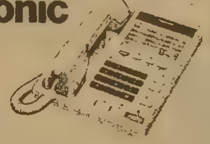
Panasonic's new dual micro cassette answering system offers an LCD Call Counter, marker message, room monitor, auto disconnect, electronic auto disconnect, electronic volume control, audible message alert, and much more for only…

$89.95

MODEL
KX-T2300
#1740219

MULTI-LINE BUSINESS PHONES

Panasonic



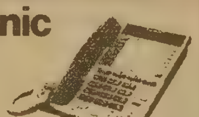
TWO LINE PHONE

A two line phone doesn't have to cost a fortune. Panasonic has the low cost answer for you. This unit has a convenient auto dialer, conference calling and much more!

$49.95

MODEL
KX-T3110
#1505313

Panasonic



2-LINE SPEAKERPHONE W/ LCD DISPLAY

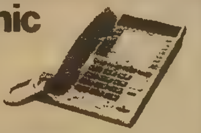
From Panasonic comes this fully featured 2-line speakerphone with LCD display, 3-way conference call, volume control for speaker and handset, 24-station one-touch dialer, auto redial, flash, separate ringer tone, line status indicator, memo dial, and save redial, all for only…

$89.95

AVAILABLE IN BLACK OR WHITE

MODEL
KX-T3175
#1745122

Panasonic



3-LINE SPEAKERPHONE WITH LCD DISPLAY

From Panasonic comes this fully featured 3-line speakerphone with LCD display, 3-way conference call, volume control for speaker and handset, 48-station one-touch dialer, auto redial, flash, separate ringer tone, line status indicator, memo dial, and save redial, all for only…

$159.95

AVAILABLE IN BLACK OR WHITE

MODEL
KX-T3185
#1768039

10 CHANNEL CORDLESS PHONES

Panasonic

10 CHANNEL CORDLESS PHONE

Most cordless phones have a very short battery life, but this one can last up to 7 days in the standby mode! Add a flexible antenna, 10 number memory, 10 channels, paging and you have an excellent value at…

$69.95

MODEL
KX-T3710
#1511389

Panasonic

10 CHANNEL CORDLESS SPEAKER PHONE

W/ LCD HANDSET DISPLAY

If you want the phone that has it all, come and see this one today! The hot new KX-T3920 from Panasonic is like having two phones in one! You can talk and dial from the base or talk back and forth thru the intercom. And it even has a 16 number Automatic dialer!

$129.95

MODEL
KX-T3920
#1768051

Panasonic

THE WORLD'S BEST CORDLESS TELEPHONE PANASONIC 900MHz

It's simply Incredible! Take this phone down the street to your neighbors for a barbeque and you will think you were calling from your own backyard! But that's not all! It's also the ultimate cordless phone for small businesses that can't afford to have anything interfere with an important call! Besides the advantages of mobility and clarity, this model has an impressive list of features including, intercom with 2-way paging, 30 channel auto scanning, auto speed dialer, private digital security and much much more! Now only...

$329

MODEL
KX-T9000
#1677122

10 CHANNEL PHONES /ANSWERING MACHINES

Panasonic

10 CHANNEL CORDLESS SPEAKERPHONE

w/ANSWERING MACHINE

This cordless answering system with sound charger technology delivers sound so clear, you will hardly believe your ears! Some of the features included are, 2- way paging, intercom, auto security system, message alert, 2-way and memo recording just to name a few. Now only…

$159.95

MODEL
KX-T 4330
#1796483

Panasonic

10 CHANNEL CORDLESS SPEAKERPHONE

w/ANSWERING MACHINE AND TIME/DAY STAMP

With speakerphone, time/day stamp, 2-way page, intercom, an auto security system, message alert, 2-way and memo recording, time check, 2 message greetings, and much more, this Panasonic cordless speakerphone with micro cassette answering machine is an excellent value at only.....

$179.95

MODEL
KX-T4370
#1796494

Panasonic

10 CHANNEL CORDLESS SPEAKERPHONE

w/DUAL MICROCASSETTE

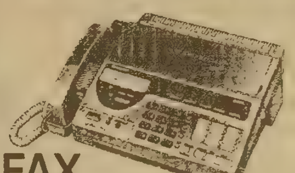
This new top of the line cordless dual microcassette answering system with sound charger technology delivers sound so clear, you will hardly believe your ears! Some of the features included are: 2-way paging, intercom, auto security system, message alert, 2-way and memo recording just to name a few. Now only…

$199.95

MODEL
KX-T4400
#1735370

FAX MACHINES

Panasonic



FAX MACHINE

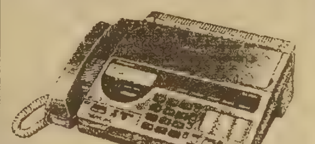
WITH ANSWERING MACHINE AND ANTI-CURL

This fully featured Fax from Panasonic comes equipped with an auto-logic answering system and anti-curl, as well as copier capabilities. It's the perfect secretary for your home or business!

MODEL
KX-F150
#1770001

$399

Panasonic



FAX MACHINE

WITH PAPER CUTTER AND ANTI-CURL

This fully featured Fax from Panasonic comes equipped with an auto-logic answering system and auto paper cutter, as well as copier capabilities. It's the perfect secretary for your home or business!

MODEL
KX-F250
#1770023

$459

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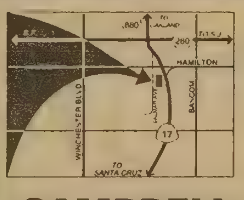

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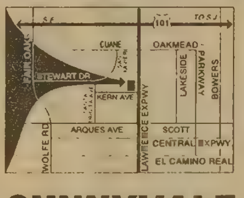

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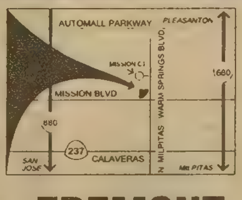

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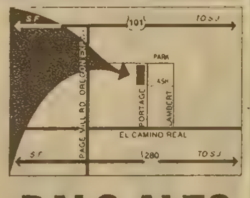

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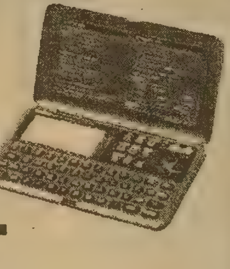
FROM THE ORGANIZER TO THE EO

ELECTRONIC DATA MANAGEMENT FOR EVERY NEED

CASIO

CASIO



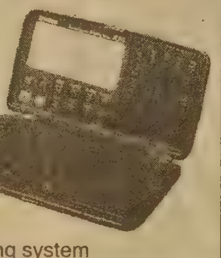
32K DIGITAL DIARY

Why carry around a calendar and schedule book, or a telephone directory and notebook, when you can do it all and more with this new digital diary from Casio.

$49.95

MODEL SF-4300
#1647189

CASIO



B.O.S.S. WITH 64KB MEMORY

This business organizer scheduling system comes packed with powerful functions that are practical and easy to use. The QWERTY Keyboard, telephone directory, calendar, memo function, schedule alarm, world time function, home time function, and schedule keeper will prove to be an invaluable tool in keeping your busy days in order. An excellent investment at...

$79.95

MODEL SF-5300
#1671137

CASIO

64K ORGANIZER W/BUILT IN SPREADSHEET

Designed for the person on the go! This executive B.O.S.S features a built-in lucid 3-D spreadsheet program that accepts Lotus 1-2-3 files plus an extra 64k for your spreadsheet files with a business card library that stores 384 characters per entry, which is enough room to record name, title, company, address, phone number, fax number, and more. Its telephone directory, schedule keeper with alarms, calendar, and PC link capability make this Casio Organizer perfect for anyone with a busy schedule at just...

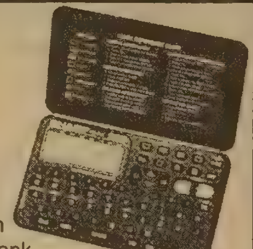
MODEL SF-8500
#1858370

$149.95

MODEL SF-8500
#1858370

SHARP

SHARP



34K PERSONAL ORGANIZER

Perfect for the business person on-the-go, this compact data bank incorporates a 14 x 3 line display, built-in calendar, schedule, phone/memo, memo pad, expense, clock, anniversary, and calendar functions as well as QWERTY keyboard to simplify data entry. Once you've used this electronic marvel, you won't leave your home or office without it.

$49.95

MODEL YO-110
#1741472

SHARP

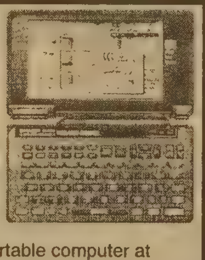
128KB BUSINESS ORGANIZER w/WIDE SCREEN DISPLAY

In today's world, it's sometimes hard to keep track of where you've been, who you've seen, and where you're going, but now it's as easy as saying "S.H.A.R.P!" With this deluxe business organizer, you can store approximately 2,470 names and numbers or 1,740 schedule appointments (128K), but that's just the beginning, the unit's internal memory can be allocated between 10 major built-in functions: An integrated schedule and to-do list with 3 different calendar views, 3 phone/address books, business card file, memo pad, outliner, home and world time clocks, and a calculator. You can send/receive electronic mail using built-in terminal emulation software and an optional PC modem, as well as, exchange data with your PC or Mac using an optional PC interface software and cable package. A must for any business person on-the-go at only...

$199.95

MODEL YO-610
#1753444

SHARP



512K PERSONAL ORGANIZER w/TOUCH SCREEN TECHNOLOGY

This Sharp Wizard lets you leave your portable computer at home but puts the power of that computer in your pocket! Here's a small sampling of the innovative features. Touch screen technology which allows you to write or draw on the screen using the Wizard pen, filer which organizes related data into folders that can be transferred to another touch screen Wizard via infared, and a true word processer with a large screen display and a keyboard that's 75% the size of a standard PC keyboard. The possibilities are endless at only...

$479

MODEL OZ-9600 II
#1797152

PDAs

CASIO

1MB PCMCIA MEMORY CARD AVAILABLE FOR ONLY $149.95

PERSONAL DIGITAL ASSISTANT

DOS COMPATIBLE W/GEOS OPERATING SYSTEM

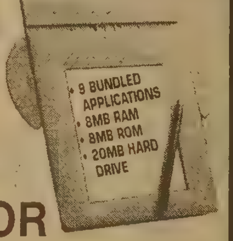
Now an amazing device, no bigger than a small paperback book, can store your hand written notes and sketches, arrange your calendar, keep track of hundreds of phone numbers and addresses, help organize your personal finances, perform complex mathematical calculations, give you easy access to electronic mail and a host of sophisticated on-line information services. With up to 100 hours of operation from 3AA Alkaline batteries, and S-RAM or Flash card compatibility, the versatility and performance of this PDA is unmatched at only...

PRICE BREAK

$599

MODEL Z-7000
#1815308

AT&T eo



PERSONAL COMMUNICATOR

"The First Truly Handheld Mobile Office"

The AT&T EO Personal Communicator is the most revolutionary advancement in Communication Technology to appear in years. By combining Faxing capability (by either Phone Line using the built-in modem, or wireless using an optional cellular module), E-Mail, Data Access, and Pen-Based computing in a single 2.2 LB Handheld Unit, the AT&T EO Personal communicator is what you need today to stay ahead in business. A COMPLETE mobile solution. A solution that keeps you in touch anytime and anywhere!

$2399

MODEL 440
#1812796

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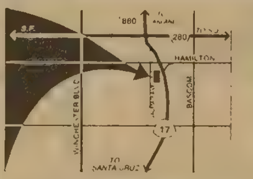

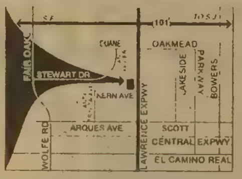

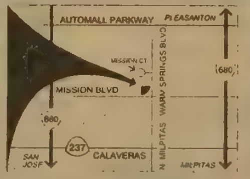

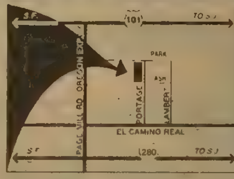

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ALL DIGITAL ANSWERING MACHINES

AT&T

ALL DIGITAL ANSWERING MACHINE

This AT&T answering system utilizes tapeless digital technology to ensure consistent recording quality over the life of the system. The convenience of new message playback, outgoing message bypass, remote system turn on or off and remote message recording makes this an excellent value at only...

$69.95

MODEL 1710
#1853906

GENERAL ELECTRIC
GE We bring good things to life

ALL DIGITAL ANSWERING MACHINE W/THREE MAIL BOXES

With three mailboxes to choose from, members of the house hold can have messages stored for them in their own mailbox! The all digital capability eliminates the need for moving parts and allows for instant playback of incoming messages-no need to wait for a tape to rewind or fast forward! Other features include voice time/day stamp, two outgoing messages, digital counter, selective message erase and much more for only...

$89.95

MODEL 2-9876
#1839261

SONY.

ALL DIGITAL ANSWERING MACHINE W/ VARIABLE SPEED MESSAGE PLAYBACK

Sony has taken digital technology to a new dimension with this beautifully-designed, all digital answering system. The variable-speed message playback controller allows you to speed up (to 1.6 times speed) or slow down (to 0.7 speed) playback of messages without changing pitch. In addition, you can skip, repeat or backspace messages. The multi-function LCD display functions as a digital message counter, clock, call timer, answer mode indicator, and back-up battery strength indicator, while the voice time/day stamp automatically records the time of the message receipt after each message. Other features include: Voice-guided operation, Pre-recorded greeting, Announce-only mode, Memory usage guage, Audible message alert, Remote on/off, Auto interrupt, Memo recording, 2-way conversation recording, and Adjustable ring delay. An invaluable addition to any home or office at only...

$129.95

MODEL TAM-1000
#1803901

AT&T

ALL DIGITAL ANSWERING SYSTEM SPEAKERPHONE w/4 VOICE MAILBOXES • 26 MINUTE TOTAL CAPACITY

AT&T's Tapeless digital technology ensures instant access and consistent recording quality. The individual voice mailbox system incorporated into this unit allows callers to leave separate messages for up to 4 people. Each of these voice mailboxes allows for a personal outgoing announcement. By utilizing the selective save and delete functions you can save the entire message or only the parts you need, and easy to follow prompts will direct you through a menu of remote commands when calling from a touch tone or rotary telephone. Other features include voice/time stamp, handset play back and record, display screen indicating time, day, and number dialed, audible message alert, priority calling, memo, and 2-way call recording. An invaluable addition to any home office at...

$199.95

MODEL 1545
#1771677

MULTI-LINE BUSINESS PHONES

GENERAL ELECTRIC
GE We bring good things to life

TWO-LINE TELEPHONE

This ingenious telephone uses dual ringers with distinct ringer sounds and seperate ringer controls for each line! By pressing the conference button you will be able to conduct a three way conversation. An excellent value at only...

$39.95

MODEL 2-9420
#1674288

AT&T

TWO LINE SPEAKERPHONE

AT&T delivers with this feature packed two-line speakerphone. The distinctive ringing feature will help distinguish which line is ringing, and 3-party conferencing allows you to bring calls from 2 phone lines together for 3-way conversations. An excellent value at...

$79.95

MODEL 722
#1548433

GENERAL ELECTRIC
GE We bring good things to life

FOUR LINE SPEAKERPHONE

This delux four-line speakerphone is capable of handling up to four lines with a maximum of 16 stations. Its convenient 32 number one-touch telephone memory, along with all station page, intercom, call transfer, busy redail, flash and much more make this the perfect addition to any home or office at just......

$149.95

MODEL 2-9450
#1768637

AT&T

THREE LINE SPEAKERPHONE

AT&T's multi-functional centrex compatible 3-line speakerphone comes equipped with page, intercom, 3-way conferencing, LCD display, 40 number memory, auto line selection, hold, do not disturb function, auto-redial, mute, programmable pause, call transfer, flash, seperate ringer controls and more, all for only......

$179.95

MODEL 843
#1853892

900 MHz CORDLESS PHONES

20 CHANNEL 900 Mhz CORDLESS PHONE

From VTech a leader in 900 Mhz cordless phone technology come this feature packed unit with 20 channel selection, a digital voice encryption system, out-of-range indicator, four programmable ringer types, one-way page, 10 number memory, mute, flash, hold, and last number redial all for the incredible price of only....

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MODEL 900 DL
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AT&T, the leader in digital telephone technology once again leads the way into the future with the introduction of this 900MHz cordless phone. By operating at the 900 MHz frequency range rather than the conventional 46 to 49 MHz range, this AT&T cordless phone will provide clearer transmission with less noise and interference from other electronic devices, as well as extended range performance! Features include 10 number memory, mute, hold, flash, last number redial, on-way paging, out-of-range-indicator, digital voice encryption, and much more for only....

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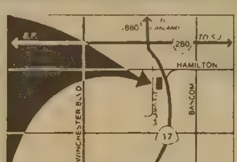

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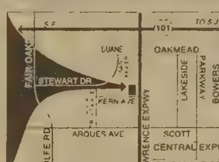

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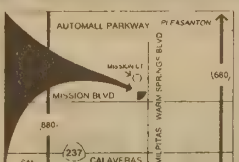

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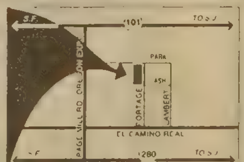

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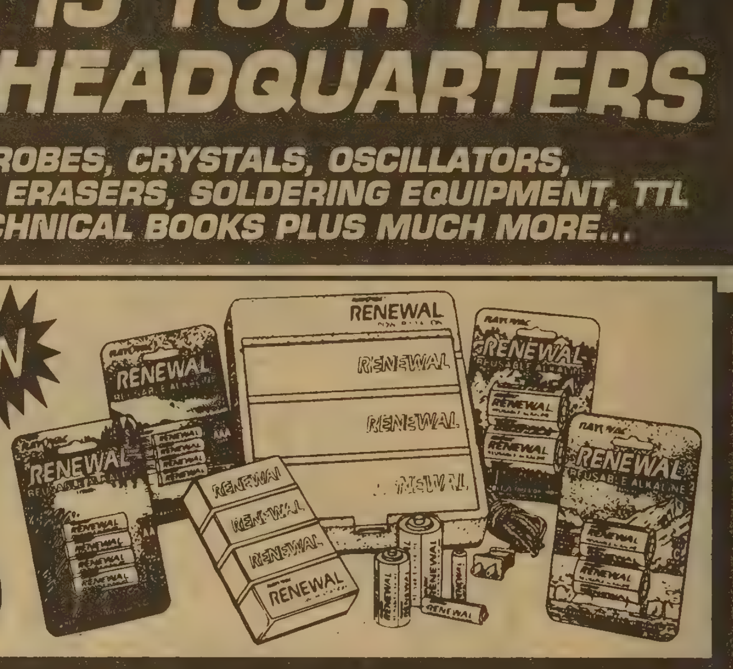

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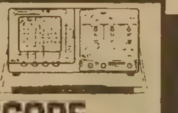

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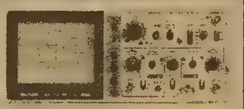

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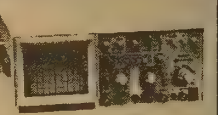

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AUTO/NORM triggered sweep operation with AC TVH TVV and the coupling
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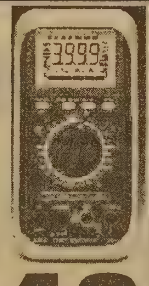

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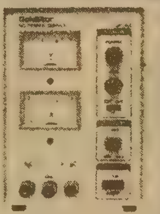

0-30 volts @ 3 amps Continuously Variable. Rugged Construction with Constant Current and Constant Voltage Operation. Overload protection circuit. Output Polarity: Positive and Negative. Low Ripple Voltage Less Than 2mV p-p.

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GP-303
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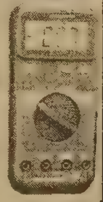

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FREE BOOT W/PURCHASE #1744648

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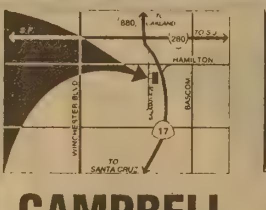

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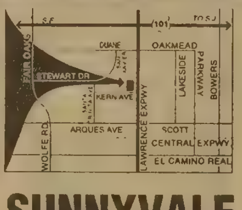

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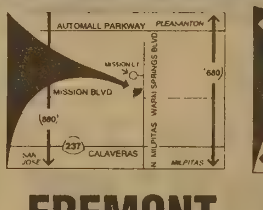

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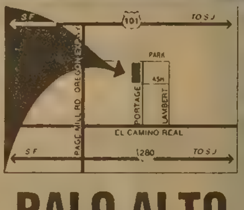

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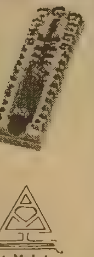

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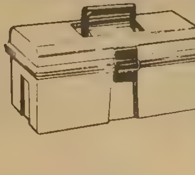

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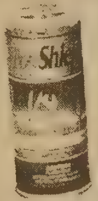

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A Computerized Robot Kit. Minor assembly required. By O.W.I.

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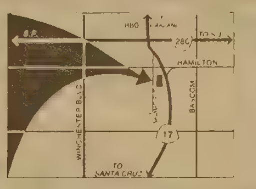

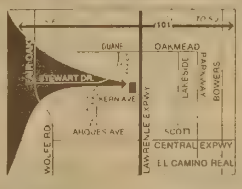

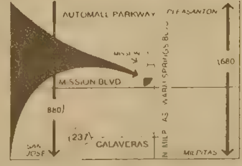

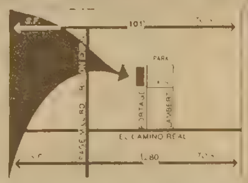

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Disk Compression For PCs

DOS 6.2 and Beyond

BY LENNY BAILES

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Doubletools, v. 1.2, $99
Addstor, Inc.
3905 Bohannon Drive
Menlo Park, CA 94025
800-732-3133

Doublespace (MS-DOS 6.2) Step-Up $9.95
Upgrade from earlier DOS, $77.95
Microsoft Corporation
1 Microsoft Way
Redmond, WA 98052
(206) 882-8080

Stacker 3.1, $99.95
Stacker for DOS/OS-2, $139.95
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Everybody can use more hard disk space. With DOS and Windows applications growing to bloated proportions, the drives we bought last year and the year before can scarcely carry the load. WordPerfect 6 for Windows alone now occupies thirty-five megabytes, more than the entire OS/2 operating system.

Disk compression products like Addstor's SuperStor and Stac Electronics' Stacker have been around for several years as low-cost remedies to hard-disk glut. Microsoft joined the party last year with DOS 6 and Doublespace. All of these disk products effectively double the storage space available on your hard disk by squashing files into a special, proprietary format.

Before the advent of DOS 6, the contortions required for "disk doubling" limited demand to a niche market. Pre-DOS 6 compression packages had to maintain duplicate sets of autoexec.bat, config.sys and key device drivers. One set resided on the compressed portion, and one set on an uncompressed portion of a boot drive. When you modified your startup files, the compression software would keep track, updating two sets of configuration files.

> ***Since Microsoft has brought disk compression into the limelight the question for users has become: is this technology reliable? Can you trust your data to a "software" compression program, or should you buy a larger hard disk?***

Microsoft changed that in DOS 6 by preloading special translation code into memory before DOS would boot. The compression kernel became part of the operating system, ensuring compatibility with existing DOS startup commands and system utilities.

Microsoft's Doublespace exposed the niche-market concept of compression to a wide range of computing environments. Once the technology was in the "prime-time" spotlight of PC computing, a number of flaws and incompatibilities with Microsoft's product surfaced. Users found that random applications would occasionally corrupt a Doublespace partition, rendering it inoperable, or wiping out unrelated data.

Additionally, when exposed to a taste of disk compression, users demanded more convenience and flexibility. The DOS 6.0 compression process was irreversible. A compressed disk could not be decompressed. DOS 6.0 Doublespace lacked other features provided by its competitors:

- Third-party compressed disks could be shrunk or expanded after being created.
- Third-party compressed disks included tools that allowed for previewing the compression ratio, monitoring and configuring compressed drives under Windows.
- Third-party compressed disks included more sophisticated error- checking and disk repair utilities.

Since Microsoft has brought disk compression into the limelight the question for users has become: is this technology reliable? Can you trust your data to a "software" compression program, or should you buy a larger hard disk?

I tested three popular packages: Addstor's SuperStor Pro, Stac Electronics's Stacker, and Microsoft's improved, MS-DOS 6.2 Doublespace. I found that all three packages appeared to be generally reliable (didn't crash suddenly, or mysteriously lose data under ordinary working conditions). Stac's Stacker proved overwhelmingly to be the most convenient and flexible.

The following are notes on my experience with the current versions of three major compression products:

SUPERSTOR

Addstor knows that its compression technology has fallen behind the state of the art. Instead of updating the 1992 SuperStor Pro package, they've chosen, instead, to issue a set of enhancement tools for Microsoft's Doublespace. (See the section on Doublespace for details.) AddStor also produced a Doublespace- compatible compression format for IBM's DOS 6.1.

The original SuperStor format, bundled with Digital/Novell's DOS and offered as a standalone package, uses the pre-DOS 6 system: it maintains two sets of configuration files.

Of the three packages I tested, SuperStor Pro offered the worst compression ratios and required the most tinkering for a successful installation. SuperStor Pro lacks the smooth automated installation procedure common to both Stacker and Doublespace. You must reboot the system several times, and may have to manually comment out and rewrite lines in your config.sys to get SuperStor up and running.

SuperStor Pro includes a preview utility to estimate the savings in storage space on a disk before you plunge in and compress. It also includes a series of disk maintenance tools that defragment, compact, or recompress a volume. You may compress either

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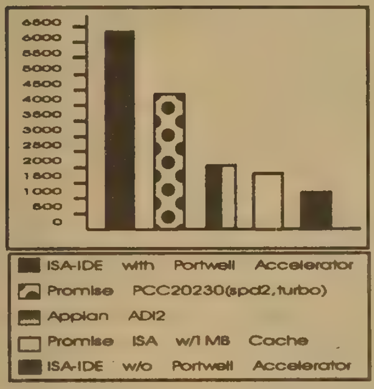

Results above were based upon the following:

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- 9.0 MBytes/sec

Host Bus Interface
- Fully VESA Local Bus compatible
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Compatibility and Installation
- Works with all operating systems
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ARTEC SCANNERS

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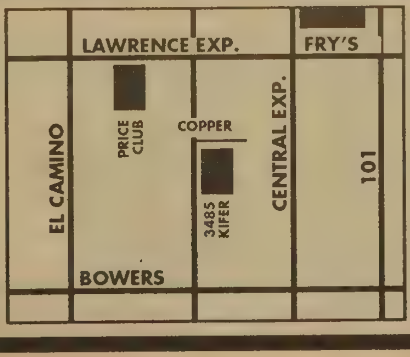

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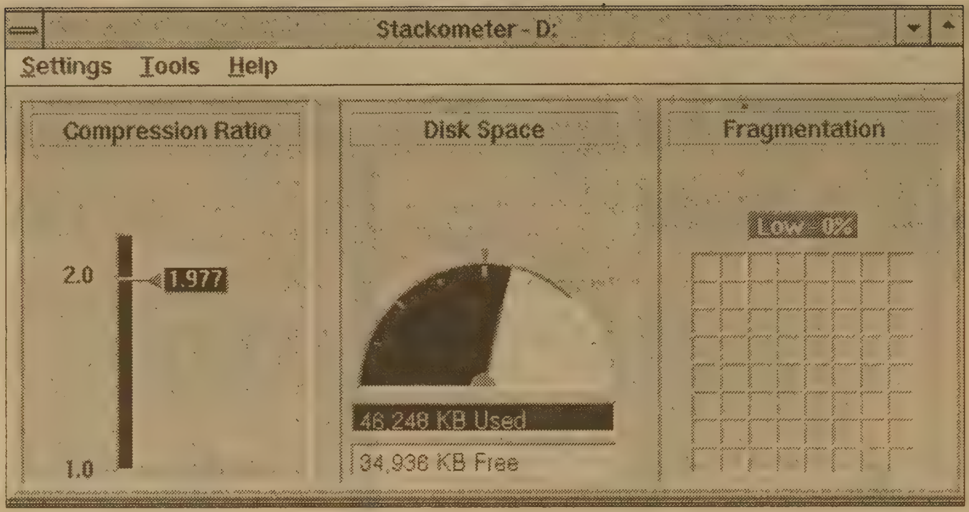

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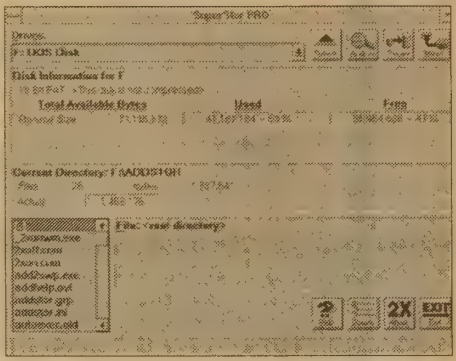

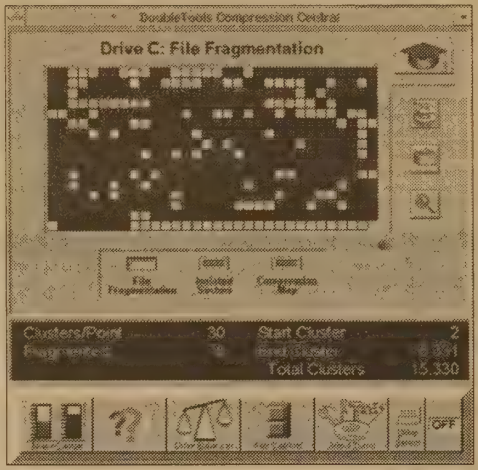

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the portion of the disk that contains files, or create a new volume from free space at the end.

Like Stacker, SuperStor Pro can create compressed removable volumes (floppy diskettes or Bernoulli units). These disks can be read on systems where no compression software has been installed. Neither the DOS 6.0 or DOS 6.2 versions of Doublespace offer this feature.

SuperStor Pro offers a graphic-based reporting utility for Windows that can mount and unmount volumes or create transportable compressed floppies. As an added frill, the package includes a special JPEG Workshop diskette. Under Windows, you can view bitmapped images in several formats and dramatically reduce their filesize with JPEG compression. If you have disks filled primarily with bitmapped graphics in TIF, PCX, BMP or TGA format, no other compression package will save you as much space (unless you own another third-party JPEG utility).

The chief disadvantage of SuperStor Pro compared to Doublespace is the necessity to maintain an "uncompressed" section of your boot drive. You'll also eat up more UMB and conventional memory with the SuperStor driver. There's no built-in procedure to convert to SuperStor's format from either Doublespace or any version of Stacker.

SuperStor lacks the advanced disk-checking features that the other two products now use on installation. This means that if you attempt to compress a disk with bad sectors or other errors, you may not find out about it until the compression procedure has gone too far to reclaim the data. (SuperStor Pro does have a "decompress" feature that allows you to restore an "error-free" compressed drive.

DOUBLESPACE (MS-DOS 6.0/6.2)

Widespread trials of Doublespace (DOS 6.0) by the PC community led Microsoft to incorporate a series of enhancements to the version included in DOS 6.2:

- DOS 6.2 now includes ScanDisk, a simple approximation of Norton's Disk Doctor. ScanDisk performs a surface test on hard disk media before Doublespace installation. Bad sectors are marked and data is moved to a good portion of the disk. Scandisk can also resolve disk errors caused by cross-linked file clusters. It can be invoked from the command-line to examine the integrity of a Doublespace volume and make repairs if flaws are found.
- The new Doublespace includes an uncompress feature, similar to Stacker's. A compressed volume can now be returned to its original state, if there's sufficient storage space left on the disk. In the event that Doublespace installation is interrupted, a partially compressed volume can also be restored. Doublespace now also includes a tuning utility that allows compressed volume to be shrunk or expanded on the fly.
- The new Doublespace includes an online integrity-checking feature called DoubleGuard. If the portion of memory that houses the Doublespace compression translator becomes corrupted, Doubleguard detects this and refuses to allow files to be copied to the drive.
- . The new Doublespace now permits compressed, removable media (floppies, Bernoulli drives, etc.) to be automounted at boot time. Note that compressed removable disks can only be read on another system that runs DOS 6.
- The DOS 6.2 installation routine has been changed for the Smartdrive disk cache. Smartdrive is now set up with delayed-write caching disabled. This is a safety precaution designed to avert problems with semi-compatible hardware configurations. Microsoft offers a special conversion diskette on request that allows users of Stacker 1.1 to 3.0 to convert Stacker volumes to the Doublespace format. (The conversion works with some Stacker 3.1 volumes, but if the program detects Stacker 3.1, you have to install the software manually.)

The new Doublespace takes more care with its inspection of the system than the first version. Doublespace in DOS 6.2 examines a disk for surface defects, before installation. It also checks the status of upper memory intermittantly after disk writes. With these features Microsoft hopes to eliminate the quirks reported by users of DOS 6.0.

Volumes created by DOS 6.0's Doublespace are compatible with the 6.2 version (although they cannot be uncompressed). Users should be aware that DOS 6.2 has forced companies who make third-party disk maintenance utilities to issue a string of compatibility updates. Detailed information is included in the Read.me file supplied with the DOS 6.2 Step-up package.

DOUBLETOOLS

Although DOS 6/6.2 has no utilities for monitoring compressed drives under Windows, AddStor, Inc.'s has designed its Doubletools package to do just that. V.1 of Doubletools must be replaced with v. 1.2, or DOS 6.2 won't recognize your compressed volumes.

Doubletools is a set of Windows utilities that can analyze a Doublespace compressed volume, adjust the compression ratio, and offer advice about disk maintenance.

The package also includes a file director feature that can read a variety of different file

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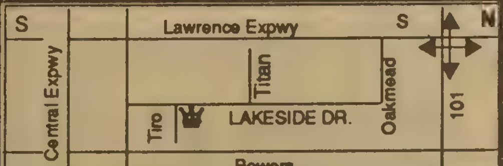

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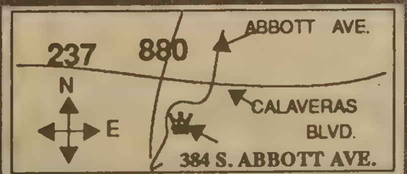

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formats. File Cabinet can prepare a filelist for copying across network drives or to a compressed transportable floppy. (Floppies compressed with Doubletools can be read on systems that aren't running DOS 6.)

The Silent Tools module of Doubletools can check and defragment a disk in the background under Windows. (This is something that I, personally, would be reluctant to try, but according to AddStor, it is a safe procedure.)

I encountered some small difficulties installing Doubletools, requiring me to resolve upper memory conflicts with my memory manager. Addstor's substitute DOUBLESPACE.BIN driver does not appear to significantly alter the performance of a DOS 6.2 Doublespace drive, but the automatic analysis and advice features offered under Windows are nice.

STACKER

From installation to everyday use, Stacker shows itself to be the industrial strength disk compression utility. Version 3.1 is designed to work with any version of DOS, and includes a special DOS 6/6.2 aware set of diskettes. Stacker is a superior product to Microsoft's Doublespace in the following ways:

- Stacker handles drives/partitions of up to one gigabyte in size, instead of being limited to 512 MB.
- Stacker's installation process is smoother and more user- friendly. It can automatically compress all the partitions on your system without user intervention. Stacker makes the necessary changes to your startup files and reboots the system when necessary. Stacker also automatically convert Doublespace volumes to its own format. The compression/setup process is somewhat faster than either SuperStor Pro or Doublespace.
- Stacker is more flexible than Doublespace. It offers a wide variety of control options for advanced users. You can "stack" RAM disks, optimize a volume for large vs. small files, or for speed vs. storage space.
- Stacker includes a set of Windows tools that can set up stacked disks from inside of Windows. The "Stackometer" warning meter flashes when a disk becomes heavily fragmented. It lists disk usage statistics in an easy-to-read graphic format.

Since I'm a user who configures and reconfigures my system, frequently, I appreciated the thoughtfulness invested in Stacker's user interface. Stacker knows about third-party disk caches, delete protection schemes, and TSR utilities. It gives you the choice of automatically disabling these features during disk maintenance functions, or proceeding without a reboot. Once you get your compressed volumes, you can swap them with uncompressed drive letters in any order, or hide the dummy uncompressed drives so that DOS doesn't see them. Stacker seamlessly intercepts DOS commands like CHKDSK and DBLSPACE, incorporating them to display detailed information on disk usage.

I found Stacker's reportage and prediction of available disk space to be the most accurate of the three compression utilities. At boot time, Stacker does a quick integrity check on each compressed drive on the sys-

continued on page 312

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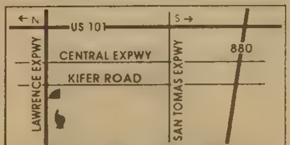

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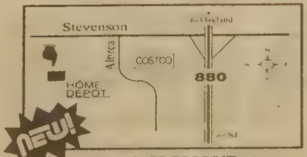

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- Buffered VESA Local Bus Slots
- 0 RAM up to 256MB on Board (30PIN)
- ZIF Expansion Slots
- 256K Cache
- 2FD / 2HD I/O Card
- Teac 1.44 or 1.2M Floppy Drive
- Focus 8000 Extended Keyboard
- Medium Tower
- 250W UL Power Supply
- CPU Heat Sink
- AMIDiag 4.0 Diagnostic Package Software

486DX33 System....$1169
486DX50 System....$1369
486DX/2-66 System .$1399

Alexis-IV

486EISA/VLB Med Tower System

Based On:

AMI Enterprise IV Board

intel inside

- Seven EISA Bus Slot
- Two VESA Local Bus Slots
- ZIF Expansion Slots
- On Board I/O
- 2FD / 2HD Card
- Teac 1.44 or 1.2M Floppy Drive
- Focus 8000 Extended Keyboard
- Medium Tower
- 250W UL Power Supply
- CPU Heat Sink
- AMIDiag 4.0 Diagnostic Package Software

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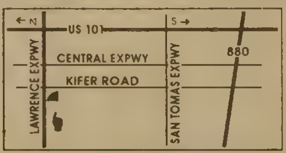

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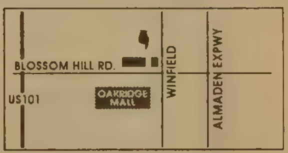

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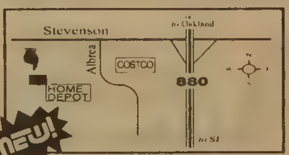

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1.37GB SCSI-II....$999
- 3.5"X1" LOW PROFILE
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CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
170MB	CP30170	64K	17ms	3.5X1"	$229	$349
212MB	CP30200	256K	12ms	3.5X1"	$289	$399
540MB	CP30540	256K	12ms	3.5X1"	$529	$639
1.0GB	CPF1060S	256	<10ms	3.5X1"	$999	$1119

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- 5400RPM
- 500,000 Hrs. MTBF

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External............................$1829

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CAPACITY	M/N	CACHE	RPM	SPEED	INTERNAL	EXTERNAL
1.0GB	3107L	3.5"X1"	5400	9ms	$999	$1129
1.0GB	3105S	3.5"	5400	9.5ms	$999	$1129
1.6GB	**3160S**	**3.5"**	**5400**	**9.5ms**	**$1249**	**$1359**
2.0GB	**5200S**	**FH**	**3600**	**12.5ms**	**$1199**	**$1399**
3.5GB	5350S	FH	5400	11.5ms	$2699	$2899

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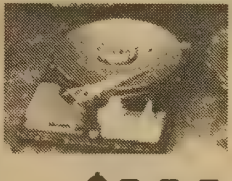

250MB IDE $229
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340MB IDE $279
12MS. MODEL#WD2340, 3Yr. Warr.

420MB IDE $359
13MS. MODEL#WD2420, 3Yr. Warr.

540MB IDE NEW! $529
12MS. MODEL#WD2540, 3Yr. Warr.

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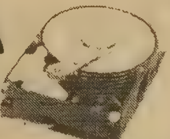

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EXTERNAL $829

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EXTERNAL $859

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12MS. MODEL#MK538FB
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2 Year Warranty

CAPACITY	SPEED	SIZE	PRICE
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250MB IDE	17ms	3.5X1"	$219

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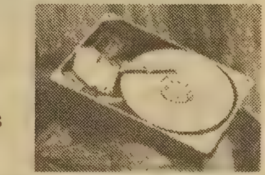

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131MB IDE...............$179
7131A, 14ms, 1 Yr. Warr.

245MB IDE...............$239
7245A, 15ms, 1 Yr. Warr.

345MB IDE...............$269
7345A, 14ms, 2 Yr. Warr.

540MB IDE...............$619
MXT-540A, 8.5ms, 256K Cache, 2 Yr. Warr.

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7245S, 15ms, 2 Yr. Warr.

345MB SCSI...............$337
7345S, 14ms, 2 Yr. Warr.

540MB SCSI...............$619
MXT-540S, 8.5ms, 256K Cache, 2 Yr. Warr.

1.2GB SCSI...............$1299
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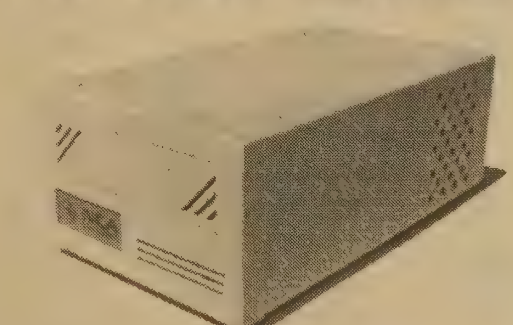

See page 6 for a complete list of all External Hard Drives, CD-ROM Drives, Tape Backup Drive...

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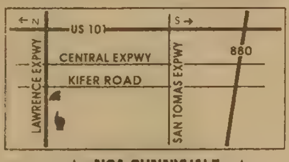

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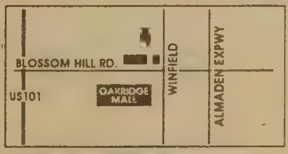

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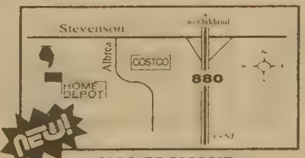

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CAPACITY	M/N		SPEED	SIZE	PRICE
127MB	GLS127AT		17ms	2.5"X17mm	$249
170MB	GLS170AT		17ms	2.5"X17mm	$279
256MB	GLS256AT		17ms	2.5"X19mm	$369
85MB	ELS85A	32K	17ms	3.5X1"	$159
127MB	ELS127A	32K	17ms	3.5X1"	$179
170MB	ELS170A	32K	17ms	3.5X1"	$189
240MB	LPS240A	256K	16ms	3.5X1"	$229
270MB	**LPS270A**	**128K**	**12ms**	**3.5X1"**	**$239**
340MB	**LPS340A**	**128K**	**Fast**	**3.5X1"**	**$379**
525MB	LPS525AT	512K	10ms	3.5X1"	$549
540MB	**LPS540AT**	**128K**	**12ms**	**3.5X1"**	**$489**

SCSI

FOR MAC POWERBOOKS

CAPACITY	M/N	SPEED	SIZE	PRICE
127MB	GLS127S	17ms	2.5"X17mm	$269
170MB	GLS170S	17ms	2.5"X17mm	$289
256MB	GLS256S	17ms	2.5"X19mm	$379

CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
127MB	ELS127S	32K	17ms	3.5X1"	$189	$309
170MB	ELS170S	32K	17ms	3.5X1"	$199	$329
240MB	LPS240S	256K	16ms	3.5X1"	$249	$359
270MB	LPS270S	128K	12ms	3.5X1"	$269	$379
525MB	LPS525	512K	10ms	3.5"X1"	$549	$669
540MB	LPS540S	128K	10ms	3.5"X1"	$569	$689
700MB	PD700	512K	10ms	3.5"	$739	$859
1.0GB	PD1050S	512K	10ms	3.5"	$869	$979
1.2GB	PD1225S	512K	10ms	3.5"	$959	$1079
1.8GB	PD1800S	512K	10ms	3.5"	$1299	$1429

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ST11900N, 9ms, 5 Yr warr.
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INTERNAL **$CALL**
EXTERNAL $2199

IDE

CAPACITY	M/N	CACHE	SPEED	SIZE	PRICE
214MB	ST3243A	32K	16ms	3.5"X1"	$198
263MB	ST3290A	64K	12ms	3.5X1"	$239
341MB	ST3390A	256K	12ms	3.5X1"	$298
452MB	ST3550A	256K	12ms	3.5X1"	$449

SCSI

CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
343MB	ST3390N	256K	12ms	3.5"x1"	$399	$529
456MB	ST3550N	256K	12ms	3.5X1"	$559	$679
525MB	ST3600N	256K	10.5ms	3.5X1"	$679	$799
1.05GB	ST11200N	256K	10.5ms	3.5"	$999	$1129
1.0GB	**ST31200N**	**256K**	**9ms**	**3.5"x1"**	**$1099**	**$1199**
1.4GB	ST41651N	256K	15ms	FH	$1099	$1299
1.9GB	ST42100N	256K	12.9ms	FH	$1489	$1689
2.1GB	ST42400N	256K	11ms	FH	$1749	$1949
2.1GB	ST12400N	256K	9ms	3.5"	$CALL	$1589
2.9GB	ST43400N	512K	10ms	FH	$2299	$2499
2.9GB	ST43401N	512K Fast-Wide SCSI-II		5.25	$2499	$2899

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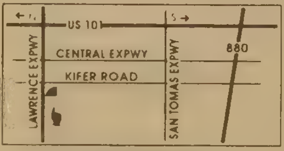

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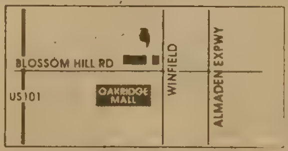

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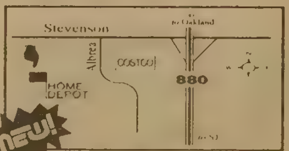

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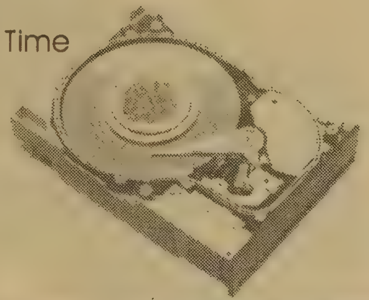

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EXTERNAL...$969

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	MODEL	RPM	SPEED	SIZE	INTERNAL
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1.75GB	MC2217A	5400	10ms	3.5"	$1299

SCSI

	MODEL	RPM	SPEED	SIZE	INTERNAL	EXTERNAL
1.0GB	MC2210	5400	10ms	3.5"	$849	$969
1.0GB	MC2210AV	Audio/Visual			$1099	$1229
1.4GB	MC1908	5400	11ms	FH	$1299	$1499
1.75GB	MC2217	5400	10ms	3.5"	$1299	$1429
1.75GB	MC2217AV	Audio/Visual			$1399	$1499
1.8GB	MC1548	3600	14ms	FH	$1499	$1699
2.0GB	MC1926	5400	11ms	FH	$1699	$1899
3.0GB	MC1936	5400	11ms	FH	$2499	$2699

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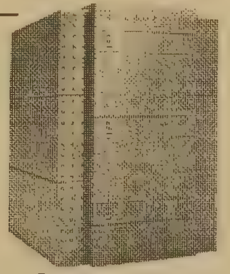

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RN4200	3X2.1GB Modules	$9599
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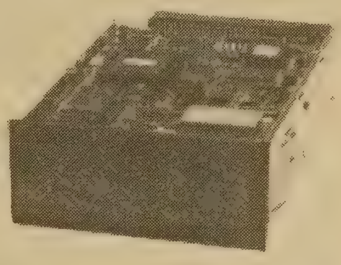

$539

IDE

CAPACITY	M/N	CACHE	SPEED	SIZE	PRICE
520MB	M2624T	64K	12ms	3.5"	$589

SCSI

CAPACITY	M/N	CACHE	SPEED	SIZE	INTERNAL	EXTERNAL
520MB	M2624FA	240K	12ms	3.5"	$539	$644
1.0GB	M2694ESA	256K	10ms	3.5"	$869	$979
2.0GB	**M2654SA**	**256K**	**12ms**	**FH**	**$1459**	**$1659**

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- 300,000 MTBF
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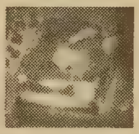
- Up to 24 Mbits/s Trans. Rate
- Up to 10 Mbytes/s Trans. Rate (synchronous)



EXTERNAL.....$1129 **$999**

2.1GB 3.5" FAST SCSI-II

- HP C2490
- 8.9ms Seek Time
- 6400RPM
- 500,000RPM
- 5-Yr. Warr.
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- Up to 10Megabytes/s (synchronous)

EXTERNAL.....$2229 **$2099**

2.47GB FAST SCSI-II

Unformatted Capacity

- HP C3010
- 11.5ms Seek Time
- 5400RPM
- 300,000 MTBF
- 5-Yr. Warr.
- Up to 24 Mbits/s Trans. Rate
- Up to 10 Mbytes/s Trans. Rate (synchronous)

EXTERNAL.....$1999 **$1799**

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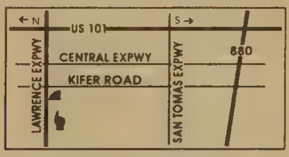

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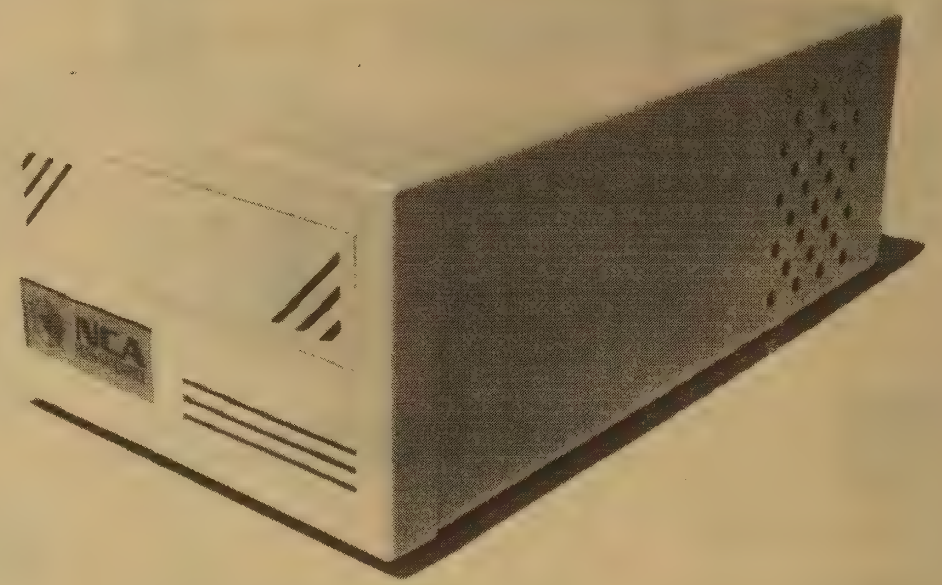

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- SCSI Cable (Cent50-Cent50 or Cent50 to DB25)
- Power Cable
- Fully Tested and Approved
- Mac Formatting and Caching Software (upon request)
- External PC Kits Available

NCA's
Barracuda I

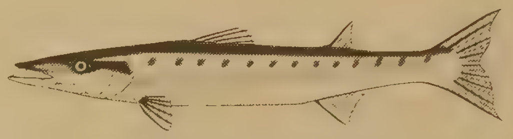
Half Height Enclosures
3.5" Fixed SCSI Disk Drives

SIZE Formatted	MAKE	SPEED	WARRANTY	PRICE
85Mb	Quantum	17ms	2Yr	$289
127Mb	Quantum	17ms	2Yr	$309
170Mb	Quantum	17ms	2Yr	$329
240Mb	Quantum	Fast	2Yr	$359
270MB	Quantum	12ms	2Yr	$379
240Mb	Seagate	12ms	1Yr	$459
245Mb	Maxtor	15ms	2Yr	$349
345Mb	Maxtor	15ms	2Yr	$447
456Mb	Seagate	10ms	1Yr	$679
520Mb	Fujitsu	12ms	5Yr	$649
525Mb	Quantum	10ms	2Yr	$669
525Mb	Seagate	10ms	1Yr	$799
540Mb	Maxtor	8.5ms	2Yr	$729
540Mb	Conner	12ms	1Yr	$639
700Mb	Quantum	fast	5Yr	$859
877Mb	Toshiba	12ms	5Yr	$829
1.0Gb	Micropolis	10ms	5Yr	$969
1.0Gb	IBM	8ms	5Yr	$1199
1.0Gb	Seagate	10ms	5Yr	$1029
1.0Gb	HP	10ms	5Yr	$1129
1.0Gb	Toshiba	12ms	5Yr	$859
1.0Gb	DEC 31055	9.5ms	5Yr	$1129
1.0Gb	Fujitsu	10ms	5Yr	$979
1.2Gb	Quantum	10ms	5Yr	$1079
1.2Gb	Maxtor	8.5ms	3Yr	$1409
1.2Gb	Toshiba	12ms	5Yr	$979
1.37Gb	Conner	10ms	1Yr	$1119
1.6Gb	DEC	9ms	5Yr	$1359
1.7Gb	Micropolis	10ms	5Yr	$1429
2.1Gb	Seagate	9ms	5Yr	$1589
2.1Gb	HP	8.9ms	5Yr	$2229
2.1Gb	DEC	9ms	5Yr	$1829

NCA's
Barracuda II

Full Height Enclosures
FH Fixed SCSI Disk Drives

SIZE Formatted	MAKE	SPEED	WARRANTY	PRICE
1.0Gb	Micropolis	14ms	5Yr	$1169
1.4Gb	Micropolis	11ms	5Yr	$1499
1.4Gb	Seagate	15ms	1Yr	$1299
1.8Gb	Micropolis	14ms	5Yr	$1699
1.9Gb	Seagate	12.9ms	5Yr	$1689
2.1Gb	Seagate	11ms	5Yr	$1949
2.0Gb	Micropolis	11ms	5Yr	$1899
2.0Gb	Fujitsu	12ms	5Yr	$1659
2.0Gb	HP	11.5ms	5Yr	$1999
2.0Gb	**DEC**	**12ms**	**5Yr**	**$1399**
3.0Gb	Micropolis	11ms	5Yr	$2699
2.9Gb	Seagate	11ms	5Yr	$2499
2.9Gb	Seagate	Fast Wdie	5Yr.	$2899
3.5Gb	DEC	11.5ms	5Yr	$2899
4.0Gb	IBM	11ms	5Yr	$3899



Combo SCSI Devices
Custom Configurations
Available

NCA's
Barracuda III

External
Non-Fixed SCSI Devices

SCSI BACKUP:

SIZE(UPTO)	MAKE	MODEL	TYPE	PRICE
250Mb	**WangTek**	**5150ES**	**1/4"**	**$339**
525Mb	**WangTek**	**E5525S**	**1/4"**	**$469**
250Mb	Archive	2150S	1/4"	$439
525Mb	Archive	2525S	1/4"	$599
1.3Gb	Archive	2750S	1/4"	$899
2.0Gb	Archive	4540NT	4mm	$1149
4.0Gb	Archive	4324NT	4mm	$1299
2.2Gb	Exabyte	EXB8200	8mm	$1799
2.2Gb	Exabyte	EXB8205	8mm	$1749
5.0Gb	Exabyte	EXB8500	8mm	$2649
5.0Gb	Exabyte	EXB8505	8mm	$2599
2.0Gb	HP	35470	4mm	$1099
8.0Gb	HP	35480	4mm	$1199
2.0Gb	WangDat	3100	4mm	$1099
8.0Gb	WangDat	3200	4mm	$1199
4.0Gb	WangDat	3300Dx	4mm	$Call
8.0Gb	WangDat	3400Dx	4mm	$Call

MAC Backup Software	*add $ 79*
NovaBack for PC or WIN	*add $ 99*
Novell NLM for 250users	*add $449*

EXTERNAL SCSI CD ROMs:

MAKE	MODEL	ACCESS	TRANSFER	PRICE
TOSHIBA	3401B	200ms	330Kb	$449
NEC	3Xe	190ms	450Kb	$629
CHINON	535	280ms	300Kb	$489
TEXEL	5028	265ms	300Kb	$369
PIONEER	604X	300ms	612Kb	$1199
TEAC	CD-50	265ms	300Kb	$379

Also Available:
External OPTICALS & Removable Cartridges by:
Syquest, Bernoulli, Maxoptix, Fujitsu, Ricoh

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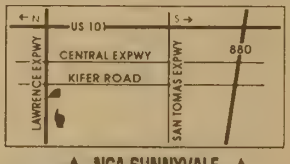

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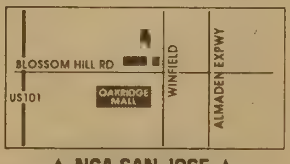

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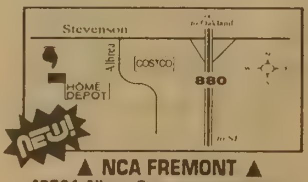

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$329

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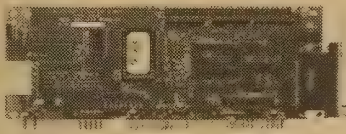
1510	CD ROM 16-BIT -SCSI CARD KIT	$99
1522	16-BIT 7HD/2FD KIT	$148
1542C	BUS MASTER COMPLETE KIT	$248
1542C+	BUS MASTER KIT WITH COREL SCSI	$314
1640	MICROCHANNEL FOR PS/2, 7HD	$319
2742	EISA KIT, 14HDS • •NEW• •	$395

American Megatrends



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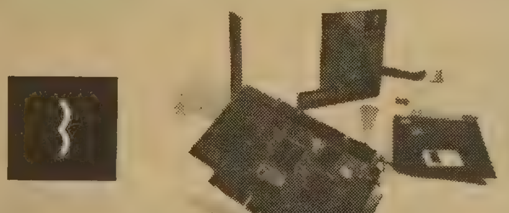
DESCRIPTION	PRICE
FastDisk NC EISA non-cache SCSI cont.	$329
FastDisk EISA Caching Controller up to 16MB	$449
FastDisk VLB VESA Local Bus Caching Controller	$449



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SCSI CONTROLLERS FOR POWER USERS

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
BT542	BUSMASTER SCSI-II KIT	$219
BT445S	VESA SCSI-II KIT	$299
BT545KT	BUSMASTER Fast SCSI	$229
BTB742KT	EISA SCSI-II Kit	$329
BTB747AK	EISA Fast SCSI Kit	$379

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Easiest to use, PLUG & PLAY with CD Drivers

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MODEL	DESCRIPTION	PRICE
IN2000	16 BIT 7HD/2FD "Easiest to use"	$175
IN2000PRO	With COREL SCSI	$215
AL1000	SCSI To PARALLEL	$159
AL1000PRO	Above With COREL SCSI	$185

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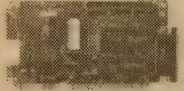

SCSI CONTROLLERS

MODEL	DESCRIPTION	PRICE
TMC850	8-BIT W/BIOS	$59
TMC1670	SVP 16-BIT SCSI VALUE PACK	$149
TMC1680	SVP 16-BIT VALUE PACK 7HD/4FD	$149

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MODEL	DESCRIPTION	PRICE
DC2040	2HD/2FD ISA (0MB, exp-16MB)	$169

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FULL KITS W/DRIVERS FOR CD-ROM/OPTICAL... ETC.

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T130	8-BIT, 7HD w/ SCSI works	$49
T228	MICROCHANNEL, 7HD	$139
T338	PARALLEL PORT to SCSI ADAPTER	$109
T348	PARALLEL PORT to SCSI PLUS	$149

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CD-ROMs, Photo CD, Tape Drives, Syquest, Opticals, Scanners, Hard Drives
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UltraStor

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MODEL	DESCRIPTION	PRICE
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24F	EISA, 64K, *Fast* (33MB/SEC)	$359
34F	VESA Local Bus Controller	$269

IDE CONTROLLERS

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IDE CONTROLLERS

MODEL	DESCRIPTION	PRICE
200	2HD/2FD CONTROLLER W/CABLES	$14
211	2HD/2FD W/2 SERIAL, 1PAR, 1GAME	$23
NCL53	SMART CONT. W/BIOS EASY INSTALL	$49
223	**2HD/2FD for VESA LOCAL BUS I/O**	**$59**
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21V	2HD (WITH BIOS), 4FD (UP TO 2.88M)	$59
32	Multi/port IDE, Floppy, Tape, & I/O accel	$99
4C	4 Channel, 8 IDE Drive accelerator	$Call

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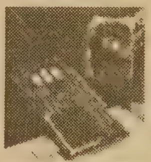

IDE CONTROLLERS

MODEL	DESCRIPTION	PRICE
DC420VLB	2HD/2FD 512K Cache (exp. -1MB)	$124
DC4030VL-II	4HD/2FD VESA (exp.-16MB)	$128
DC200M	4HD/2FD ISA 512K Cache (exp.-8.5MB)	$129
DC200	4HD/2FD ISA 512K Cache (exp - 16MB)	$95

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WONDER 16550 IDE CARD

2 IDE DRIVES/2 FLOPPY
2 HIGH SPEED 16550 SERIAL PORTS
1 PARALLEL PORT / 1 GAME
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- 4 Floppy
- 2 Parallel
- 4 Serial
- 1 Game

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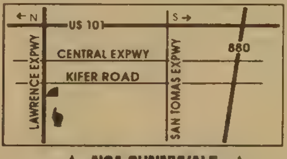

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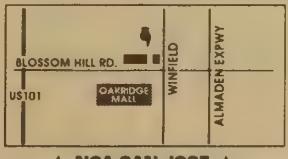

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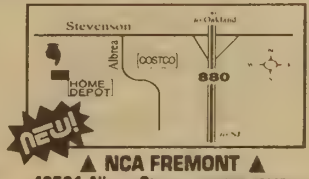

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VESA LOCAL BUS *SCSI* HOST CONTROLLER

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- DOS CD-ROM drivers
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VESA LOCAL BUS *IDE* CONTROLLER WITH MULTI-FUNCTION I/O

- High Performance - Up to 8.3MB/sec "Featuring the DTC 805 Single Chip Controller"
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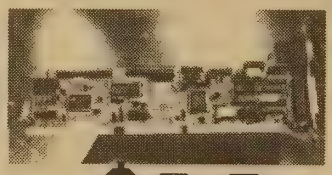

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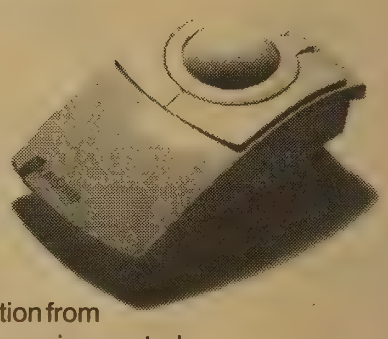

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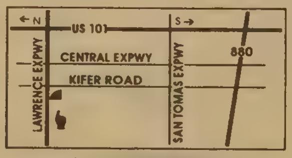

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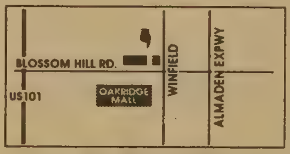

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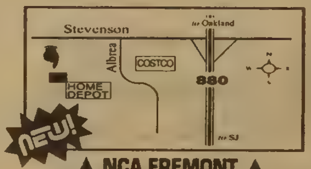

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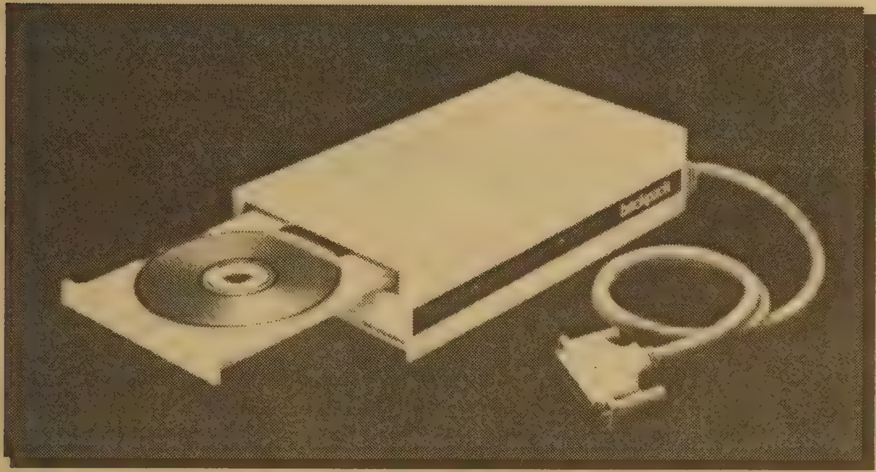

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- Double Speed High Performance drive
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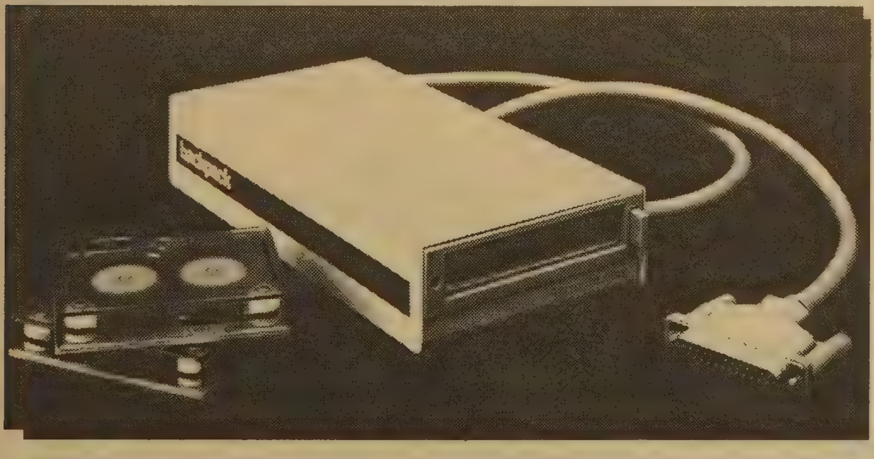

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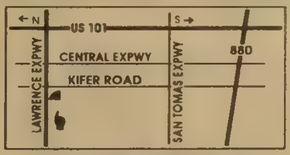
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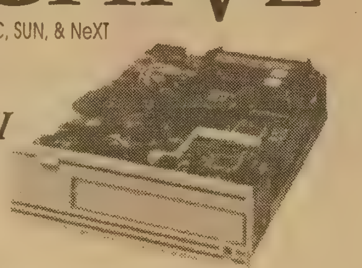

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- 6MB/MIN.

INT.	EXT.
$339	$449

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- 525MB VIPER
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$499	$599

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- 1/4" TAPE UNIT

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- 1MB Cache Buffer

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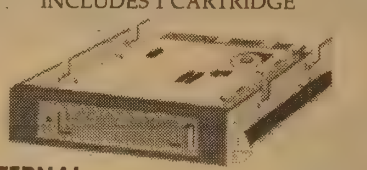

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$139

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RUNS OFF PARALLEL PORT
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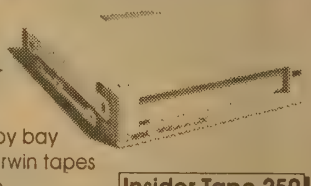

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- Fits Standard 3.5" floppy bay
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Insider Tape 250
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EXTERNAL TAPE 250 PARALLEL PORT $359

IOMEGA 250MB Formatted tapes
Single .... $29 **3Pack $79**

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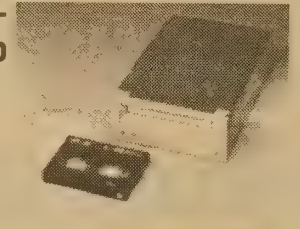
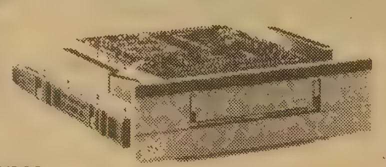


The most reliable SCSI Tape Backups for MAC, PC or SUN

SCSI 4mm DAT

CAPACITY	MODEL	INTERNAL	EXTERNAL
2.0GB	35470 DAT	$999	$1099
4-8GB	35480 DAT	$1099	$1199
4-16GB	C1533A	$1699	$1829

COLORADO MEMORY SYSTEMS INC.



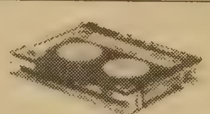
Uses 2120 Tapes

RUNS OFF FLOPPY PORT

CAPACITY	MODEL/TYPE	INTERNAL
120MB	DJ10 JUMBO120	$99
250MB	DJ20 JUMBO250	$165

EXTERNAL KIT WITH CARD AND CABLES KE-10	$109
EXTERNAL TAPE PORT AB-11	$35
FC-10 TAPE CONTROLLER, WITH CABLES	$79
TC-15 HIGH PERFORMANCE 16-BIT CONTROLLER	$169

TAPES & CARTRIDGES



DESCRIPTION	SINGLE	5-PACK
2120 (120/250MB)		
SONY QD2120 120/250MB	18.95	89.00
3M 2120F FORMATTED XMAT	18.00	89.00
MAXELL DC2120 UNFORMATTED	16.99	79.00
MAXELL DC2120 FORMATTED Q80	19.99	89.99
6000(1/4" TAPES)		
SONY QD6150 150MB	22.95	107.50
SONY QD6250 250MB	28.95	137.50
SONY QD6525 525MB	33.95	155.50
DAT 4mm 90meters		
SONY 90M	17.95	75.00
TDK DC4-90	13.99	65.00
DAT 8mm 112meters		
EXABYTE UP TO 5.0GB TAPES	18.00	89.00
TDK DC8-112	9.99	45.00
FLOPPY DISKS		
SONY 2.88M DISKS	10PACK ONLY	$62.50
BULK 1.44M 3.5" FORMATTED	.68¢	25PACK $15.99
BULK 1.2M 5.25" FORMATTED	.39¢	25PACK $9.99
REMOVABLE DISKS		
SYQUEST 44MB SQ400	$65.00	$309
SYQUEST 88MB SQ800	$99	$489
SYQUEST 105MB 3.5"	$69	$345
BERNOULLI	See pg. 15	
RICOH 128MB	$49	239
MAXELL 128MB OPTICAL	$42	199
MAXOPTIX 1.0GB GLASS OR POLY	$199	979
RICOH 650MB	$145	$699

WANGTEK

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Uses DC6250 1/4" Tape QIC-150 or QIC-120 64K Cache Buffer 1.8Mbyte per Second. Asynchronous data transfer. 5.25" half height.

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External 525MB for PC $339
External Version for Mac $399

525MB External SCSI Tape Backup

CaExternal E5525S SCSI Drive Includes: One 525MB Cartridge, Cable, & SCSI Terminator

$469

External Macintosh Kit: 525MB Tape Drive, Cartridge, & Surfguard Software $549

WangDAT™

SCSI 4mm DAT

CAPACITY	MODEL	INTERNAL	EXTERNAL
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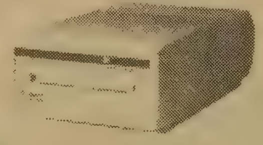
2-4GB	3300DX	$Call	$Call
4-8GB	3200 DAT	$1099	$1199
4-8GB	3400DX	$Call	$Call

Trakker™

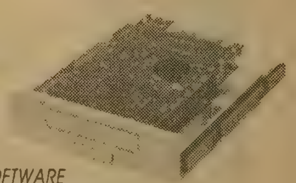


PARALLEL PRINTER PORT EXTERNAL TAPE BACK-UP SYSTEMS

RUNS OFF PARALLEL PRINTER PORT

CAPACITY	MODEL/TYPE	EXTERNAL
120MB	TRAKKER 120	$289
250MB	**TRAKKER 250**	**$329**

SUMMIT™ MEMORY SYSTEMS INC.



WITH CENTRAL POINT BACKUP SOFTWARE

RUNS OFF FLOPPY PORT

CAPACITY	MODEL/TYPE	INTERNAL
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250MB	SE-250	$159

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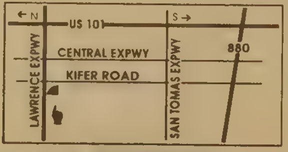

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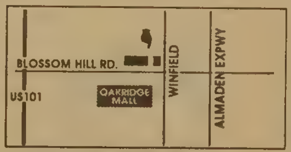

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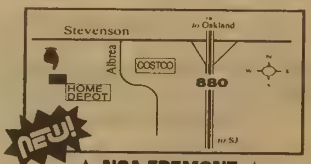

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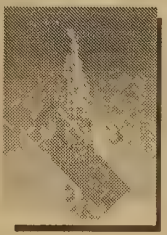

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MultiSound uses 126 CD-quality, 16 bit, digital samples of real instruments
Digital Audio:Stereo Mixer: MIDI Synthesizer: Digital Signal Processor:

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- **Windows Sound Card Compatible** - Turtle Beach MIDI Karaoke supports any Windows 3.1 sound card. The MIDI section is totally General MIDI compatible.
- **Bitmap Import** - import any .BMP file to create custom backgrounds for your song text to scroll

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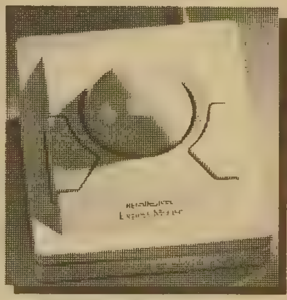
Expert Mouse® 4.0



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- First Trackball completely integrate hardware and software for total cursor control
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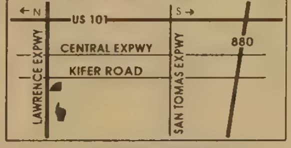

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  MPC
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- ▶ Multimedia Encyclopedia, Animals, San Diego Deluxe, Just Grandma & Me, Sherlock Holmes, Monkey Island, Secret Weapons & loom.
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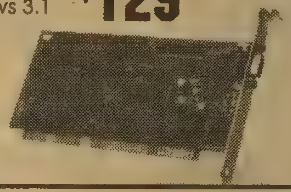

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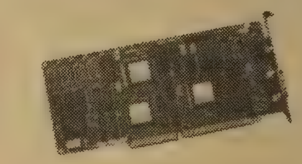

- ▶ Plays Video CD feature films on your PC
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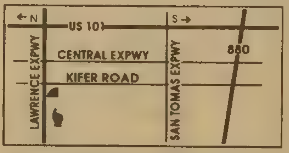

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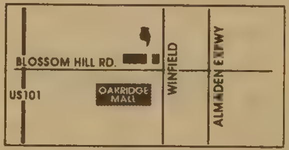

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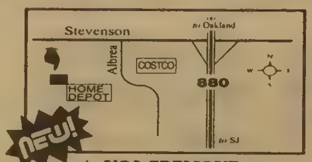

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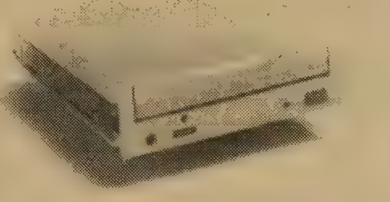

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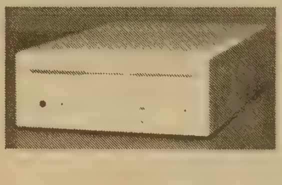
Top of the line SCSI-II CD ROM



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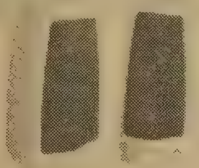

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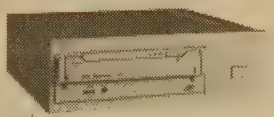

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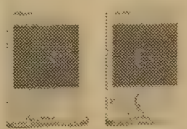

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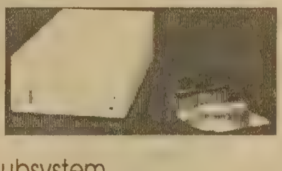

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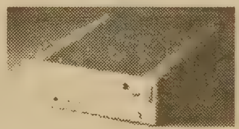

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- DUAL SPEED
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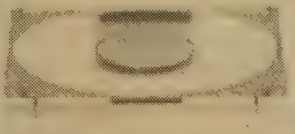

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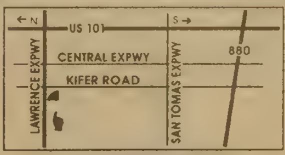

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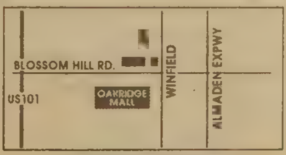

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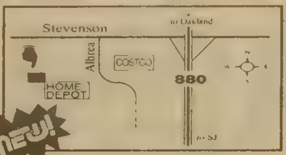

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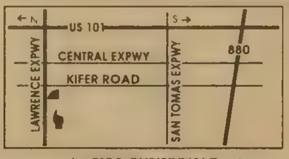

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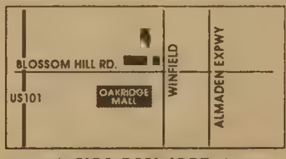

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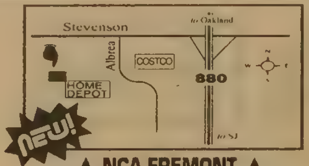

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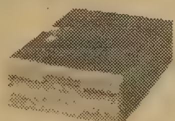

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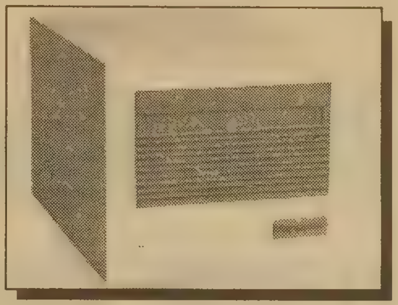

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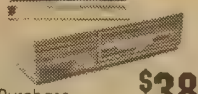

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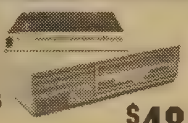

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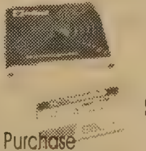

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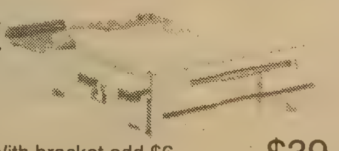

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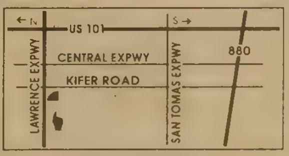

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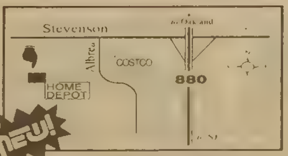

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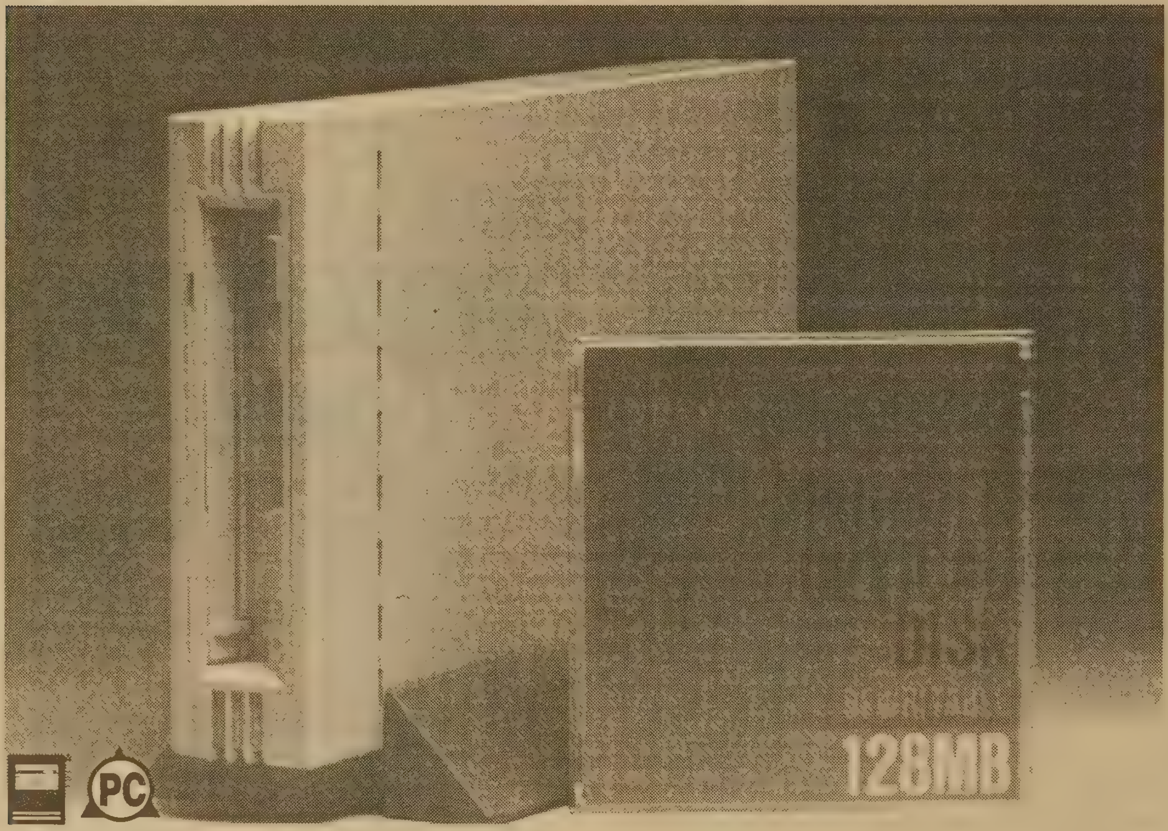
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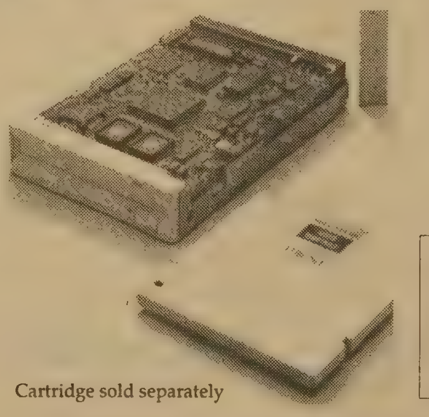

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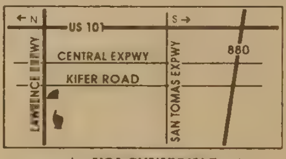
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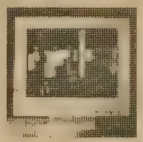

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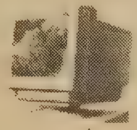

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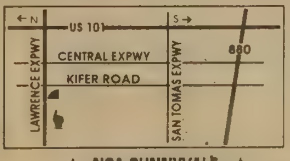

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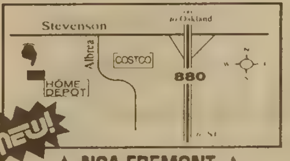

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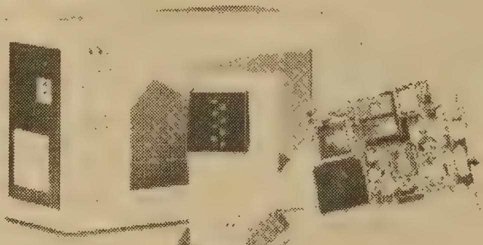

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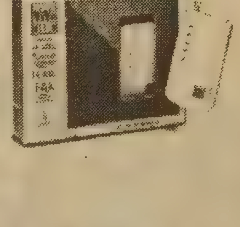

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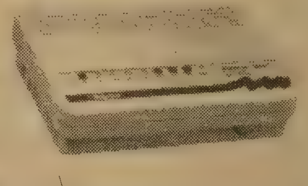

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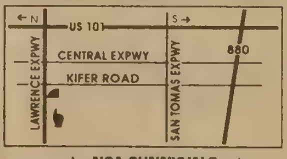

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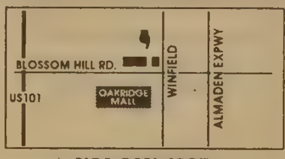

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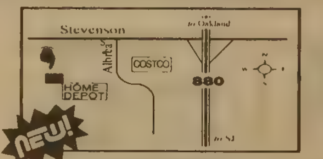

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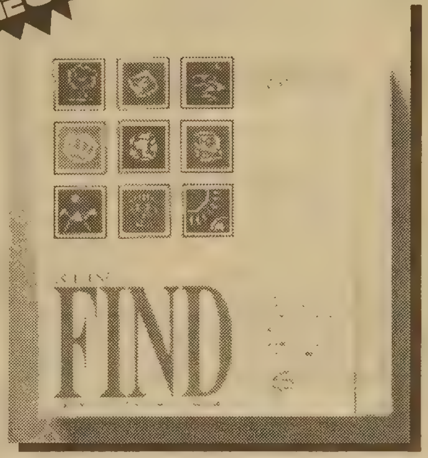

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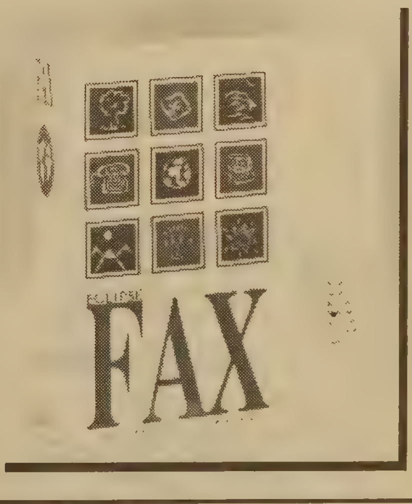
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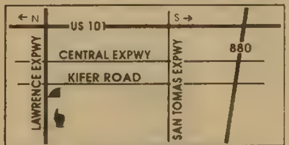
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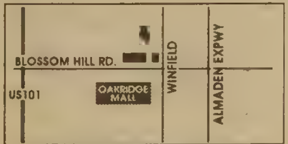
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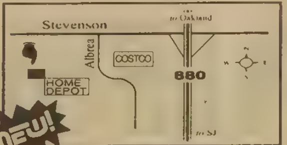
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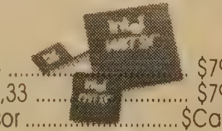

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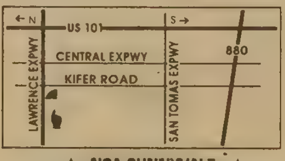

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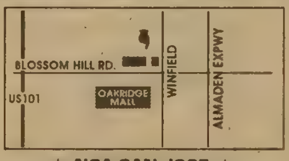

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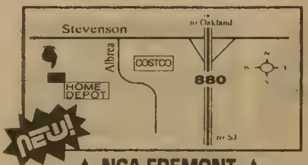

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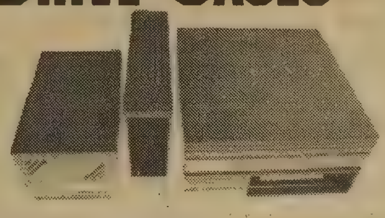

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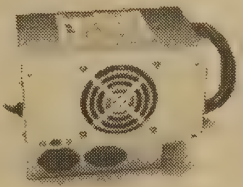

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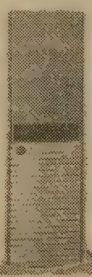

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NAME	PRICE
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ScanMan Color	$449
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ScanMan 32	$\$99^{99}$
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Microsoft

NAME	PRICE
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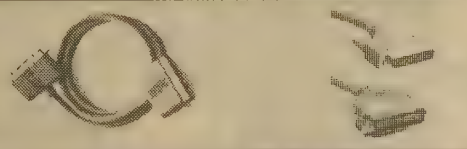

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SONY QD6525 525MB	33.95	155.50
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SONY 90M	17.95	75.00
TDK DC4-90	13.99	65.00
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EXABYTE UP TO 5.0GB TAPES	18.00	89.00
TDK DC8-112	9.99	45.00
FLOPPY DISKS		
SONY 2.88M DISKS	10PACK ONLY $62.50	
BULK 1.44M 3.5" FORMATTED	.68¢	25PACK $15.99
BULK 1.2M 5.25" FORMATTED	.39¢	25PACK $9.99
REMOVABLE DISKS		
SYQUEST 44MB SQ400	$65.00	$309
SYQUEST 88MB SQ800	$99	$489
SYQUEST 105MB 3.5"	$69	$345
BERNOULLI	See pg. 15	
RICOH 128MB	$49	239
MAXELL 128MB OPTICAL	$42	199
MAXOPTIX 1.0GB GLASS OR POLY	$195	979
RICOH 650MB	$145	$699

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DESCRIPTION	PRICE
FOCUS 2000 W/COVER	$42.99
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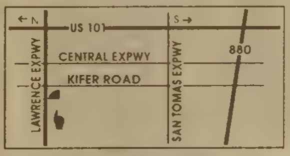

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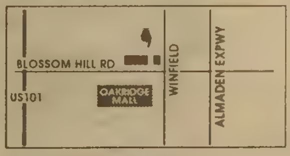

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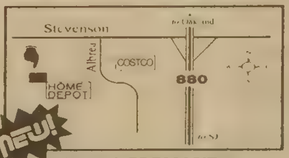

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continued from page 134

that allows Cyrix to develop new chips in greatly reduced time and further shorten product cycles.

HEIDI ROIZEN
CEO
T/MAKER

Roizen's taken T/Maker through an impressive paradigm shift in the last year. After discovering in 1992 that sales of the clip art package FaxMania exceeded the sales of the new version of WriteNow by a considerable margin, she and the company's management set about repositioning it as a content provider rather than an application vendor.

After divesting itself of WriteNow early in the year, T/Maker proceeded to make great strides in its chosen direction, shipping graphics content software in product lines aimed at the professional and consumer markets. The company also shipped its first interactive CD-ROM, the edutainment "book" Four-Footed Friends. Friends is the first in a series of titles to be created around T/Maker's ZoomBook Interactivator! multimedia interface.

LOUIS ROSSETTO
PUBLISHER AND EDITOR-IN-CHIEF

JANE METCALFE
PRESIDENT
WIRED

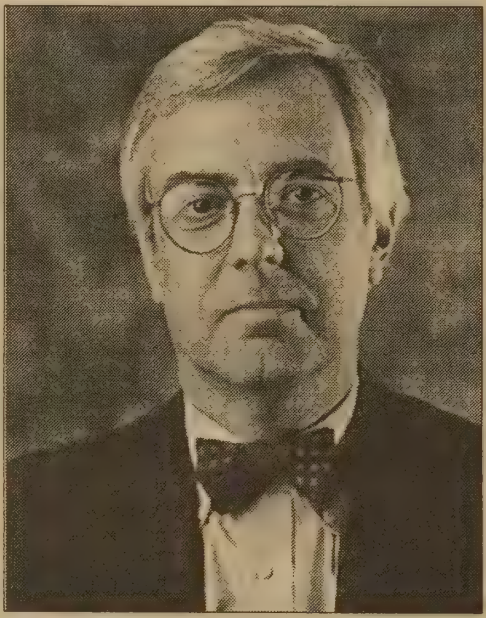
Since *Wired*'s hype-and-skepticism-ridden launch in January 1993, Rossetto and Metcalfe have not only confounded the naysayers by making a slick digital-lifestyle magazine profitable, they've made technology positively trendy in formerly nerd-intolerant circles. Technologies, cultures, and ideas converge with a vengeance in *Wired*'s evolving rave-on-a-page format, and if the lines sometimes blur between content, style, and attitude, well, to invoke the magazine's patron saint Marshall McLuhan, the medium is the message.

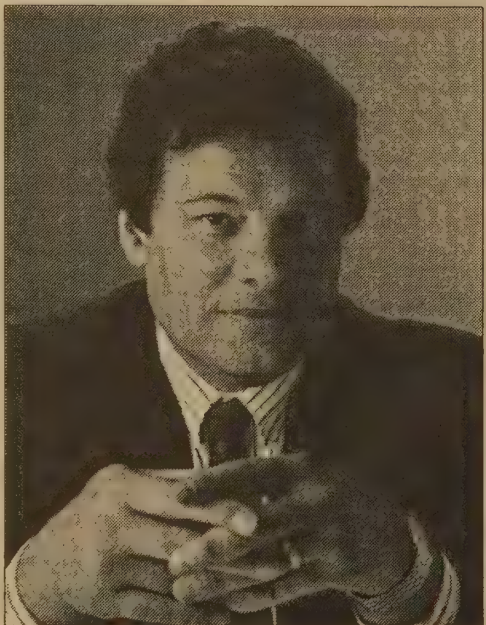
ALAIN ROSSMAN
PRESIDENT AND CEO
EO

Rossman has steered EO through an eventful year in which it shipped its first Personal Communicators, merged with pen-based OS developer GO, and was acquired by AT&T, one of its major investors, which is now marketing the Communicators under its own name. As Rossman himself admits, it remains to be seen what uses customers will find for the brand of tetherless mobile communication that EO represents, but the company's in an excellent strategic position to take advantage of the emerging market.

NICHOLAS A. SAMUEL
CHAIRMAN AND CEO
INSIGNIA SOLUTIONS

Samuel's been able to build a strong company by addressing a crucial need of heterogeneous computer environments—the running of DOS and Windows packages on Macintosh and other non-Intel platforms. Critics argue about the performance downside of software emulators, but for thousands of users the SoftPC products have given them the affordable option of keeping their hardware platform of choice while running the software program of necessity.





Top to bottom: Heidi Roizen, Dick Shaffer, Michael Spindler.

TED SELKER
MANAGER, USER SYSTEMS ERGONOMICS RESEARCH
IBM ALMADEN RESEARCH CENTER

Reader Michael Mosher brings Dr. Selker to our attention for the significant feat of designing the TrackPoint II, an in-keyboard pointing device featured on many of IBM's ThinkPad computers. More than an alternative to a mouse or trackball, the TrackPoint II allows users to integrate typing and pointing seamlessly, without lifting their hands from the keyboard. This results in better ergonomics and enhanced productivity.

We're happy to take Mr. Mosher up on his suggestion and send Dr. Selker a hearty round of applause.

JONATHAN SEYBOLD
PRESIDENT
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As computer-based publishing comes to encompass virtually all forms of human expression, Seybold brings together the key people and asks the tough questions that need to be addressed, from technology standards to legal issues. His Digital World and publishing expos serve as a mecca for print and multimedia professionals trying to keep up with the latest hardware, software, and connections.

DICK SHAFFER
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A mecca for the investment and analyst communities, Shaffer's conferences provide a unique opportunity to discover new technologies and analyze emerging trends, as well as form companies and make deals. Shaffer's shrewd analysis cuts through market-department slogans and takes a no-nonsense view of the rollercoaster world of technology, and serves as an invaluable asset to the entrepreneur.

MICHAEL SLATER
EDITOR AND PUBLISHER
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and vendors in the upcoming platform wars, Slater's publications are a vital survival guide.

MICHAEL SPINDLER

CHAIRMAN, PRESIDENT, AND CEO

APPLE COMPUTER

Longtime Apple employee Spindler assumed full charge of the company in the summer of 1993 after the much-ballyhooed ouster of John Sculley. While it's clearly too soon to tell what influence he'll have on the company's long-term direction, the short-term results bear out his reputation for balancing advanced technology and market responsiveness, as Mac prices keep falling, Windows makes its way to Mac on Houdini boards, and Power PC awaits its impatient audience.

ROBERT DAVID STEELE

PRESIDENT

OPEN SOURCES SOLUTIONS

The intelligence-gathering branch of the government was probably most in evidence this year in its probably-doomed efforts to keep strong cryptography out of the hands of the general populace. This, however, is a relatively small symptom of a much larger phenomenon—as the Tofflers explain in *War and Anti-War,* the military and intelligence communities are experiencing about the same level of culture shock moving into the information age as the rest of us.

With long experience in the military and diplomatic sectors, Steele has been able to put together what's probably the most interesting cross-cultural event in computerdom right now—the Open Sources conferences in Washington, DC, at which vendors hawk the latest in high-tech intelligence-gathering wares, and an audience of top research, law enforcement, and military types from around the world chats with lawyers, hackers, and journalists. Presentations at this year's conference included a youthful-but-senior official of the Croatian government explaining his country's conviction that Internet connectivity is vital to its future, military types daring to raise the notion that they often get timelier information from CNN than from that expensive top-secret report, attorneys suggesting impending changes in intellectual property laws, and other issues being confronted in our world of rapidly shifting borders.

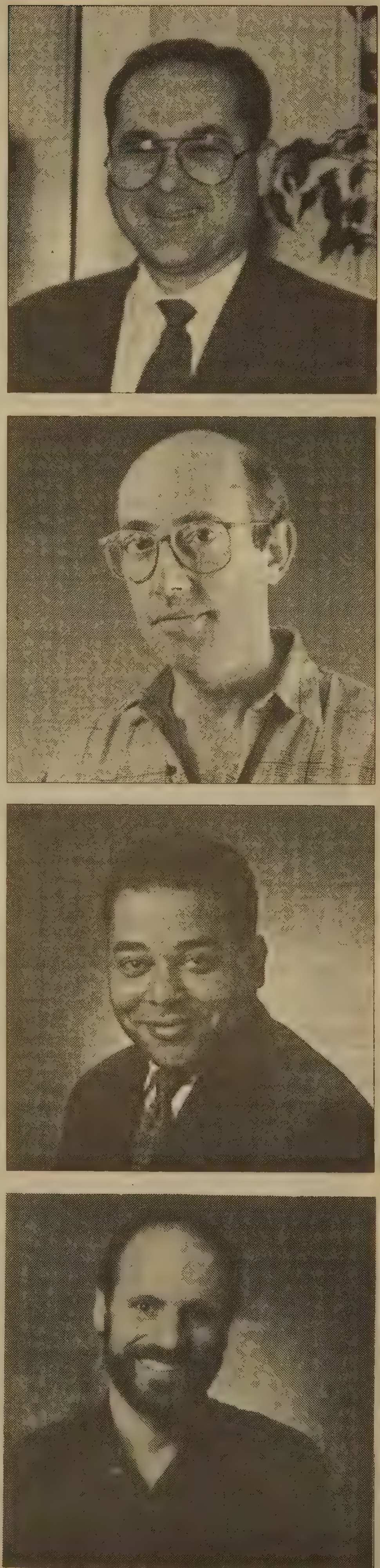
ROBERT STEIN

JONATHAN TURELL

COFOUNDERS

THE VOYAGER COMPANY

As computer technology evolves away from being an end in itself toward serving as a window on digital information, Stein and Turell have led the way in providing state-of-the-art digital content. While Silicon Valley and Hollywood try to figure out useful alliances, Stein, who oversees product development, and Turell, who focuses on acquisition and licensing, already have a healthy range of titles combining the best of technology and showbiz: the Criterion Collection of annotated films on laserdisc; the Expanded Books series of best-selling books with enhanced linking and search features; and a host of CD-ROM titles ranging from the pioneering Beethoven: Symphony No. 9 to a full-length version of *A Hard Day's Night.* Collaborating with distinguished authors and artists ranging from Spike Lee to Marvin Minsky to The Residents, Voyager appears likely to combat digital vacuity for years to come.



Top to bottom: Robert Steele, Robert Stein, Alex Vieux, Ted Selker.

NEAL STEPHENSON

AUTHOR

SNOW CRASH

Long before the spreadsheet, science fiction was an important visualization tool. In *Snow Crash,* one of the year's most widely read and thought-provoking books, Stephenson creates an all-too-plausible scenario of artificial reality in the Metaverse, a digital world in a constant state of line-blurring with its analog counterpart. By the time you've been through its horrifyingly engaging adventures, you've developed a new appreciation for unsuspected aspects of human-computer interaction and lost any sense you may have had of multimedia as a panacea.

Snow Crash itself started out as a multimedia project, but the state of technology at the time convinced Stephenson that text was the proper medium in which to tell the story. This is not to say that some enterprising developer won't have some ideas on the subject, however.

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CHAIRMAN

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VERNOR VINGE

AUTHOR

A FIRE UPON THE DEEP

Vinge, a computer scientist and professor at San Diego State, won a Hugo Award for this epic, and well deserved it was, too. Most of the technology and events portrayed therein take place well outside this magazine's normal frame of reference, at least until they emerge in the interactive computerized version.

But, especially since 1993 was the year in which the Internet became a media darling, we feel compelled to salute Vinge for his masterful

Continued...

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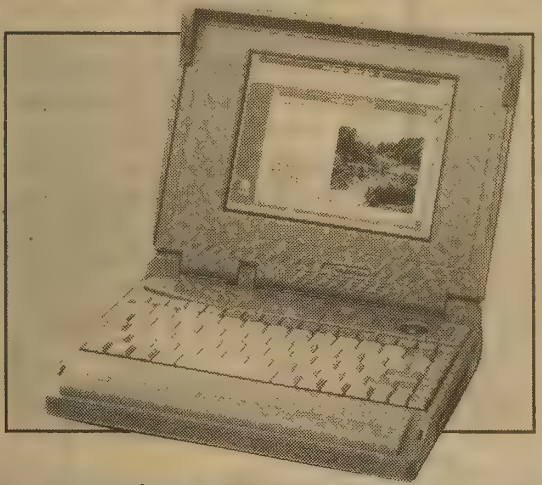

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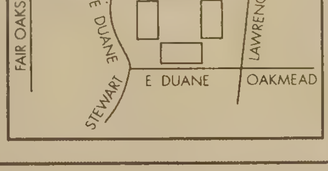

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486DX2-66/256K w/2VLB	$570
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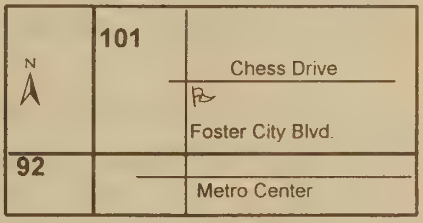

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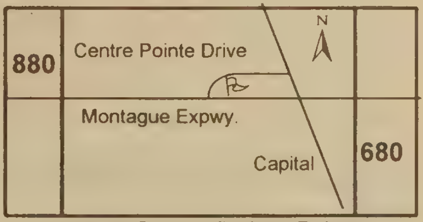

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evocation of its future intergalactic counterpart, in which the full range of arrogance, bozohood, dweebdom, and flamage that entertain today's users flourishes, complete with even more technology-driven communication problems. Quite aside from the book's compelling plot, it's a must-read for any net denizen just for that look at a unique aspect of net culture.

JOHN WARNOCK

CHAIRMAN AND CEO

ADOBE

Anticipating the commoditization of Adobe's flagship product PostScript, Warnock's led the push for a next-generation standard of universal document exchange with a technology called Acrobat, which allows digital information of assorted media and platforms to be passed around transparently regardless of such previously crucial issues as platforms and applications. Acrobat's acceptance as a standard seems to have been slowed somewhat by Adobe's decision to charge customers for each copy of the reader software, which in turn created a lucrative niche for shrewd competitors who proceeded to give their readers away. However, if PostScript's career is any indication, Warnock's ability to combine vision and market sensitivity will stand him in good stead as Acrobat evolves.

JIM WARREN

CITIZEN

You can read some of Jim Warren's sterling career accomplishments in the bio that accompanies his column in this issue, but his major feat in 1993 was his tide-turning support of AB1624, Assemblywoman Bowen's bill to make pending legislation available to the public in electronic form. Bowen's staff had all but given up on the bill, but Warren led a charge on the nets and in print to rally support for it. Many, many faxes, email messages, political wrangles, and forays to Sacramento later, the bill is law.

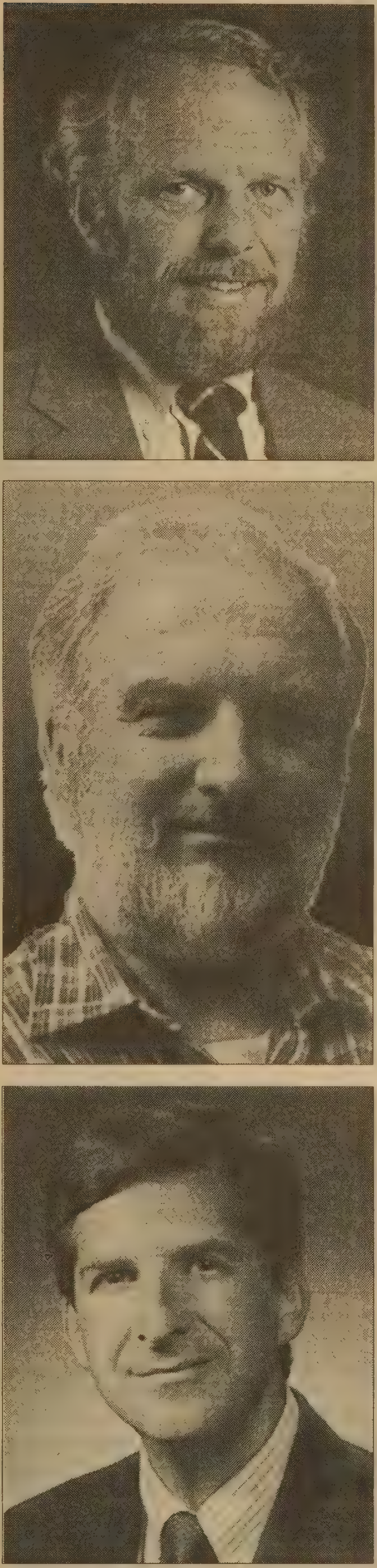
Jim is now contemplating online access to campaign contribution records...

KEN WASCH

EXECUTIVE DIRECTOR

SOFTWARE PUBLISHERS ASSOCIATION

While perhaps best known for his hawkish stance on intellectual property issues, Wasch is involved with a myriad of important efforts of the SPA, from its annual awards program for excellence in software to the rapid changes in software distribution and their implication for publishers. Wielding considerable influence in the creation of software-related legislation, he is also an effective and passionate advocate for the interests of the software industry in numerous talks and panels throughout the year.



Top to bottom: John Warnock, Jim Warren, Ken Wasch.

MAURICE WEITMAN

GENERAL MANAGER

THE WELL

Weitman and his resourceful staff displayed enormous grace under frequent and weird pressure during 1993 as The WELL was suddenly discovered big-time by the mass media and the global network. By year's end, a major hardware upgrade had been implemented and most of the attendant hassles eliminated; meanwhile new users continue to arrive from all over the world attracted by pointers as varied as longtime WELL denizen Howard Rheingold's *Virtual Community* and national news coverage of the peculiar episode of the Online Lothario.

PHILLIP E. WHITE

CHAIRMAN, PRESIDENT, AND CEO

INFORMIX SOFTWARE

Three years ago, Informix was losing millions, and by 1992 White had achieved a dramatic turnaround, quadrupling the stock's value and more than doubling its earnings. Today the company has the world's largest installed base of UNIX database management systems; its current earnings are exceeding the 1992 performance that garnered White several prestigious awards, including Entrepreneur of the Year in the "turnaround" category from the San Francisco Bay Area Entrepreneur of the Year awards, and CEO of the Year from *Financial World* magazine.

ALAN YU

CHAIRMAN

UNSC DEVELOPMENT

Yu, a successful entrepreneur with a strong presence in all aspects of the PC industry from design to retail, was a driving force behind the creation and production of CompuExpo, a new globally oriented trade show that allowed product designers and manufacturers to meet with system integrators and other interested customers from the vendor community. This provided a significant opportunity for small, relatively unknown developers to showcase their innovations and reach markets formerly closed to them, and for large vendors to find new product sources.

PIERLUIGI ZAPPACOSTA

PRESIDENT AND CEO

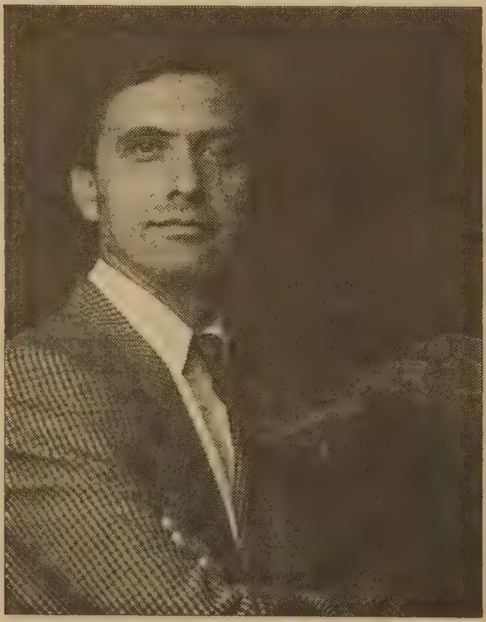
LOGITECH

Zappacosta's attention to emerging technologies and markets has made Logitech a big winner in the graphics and multimedia market. In addition to a host of mice, cameras, sound devices, and such under its own label, Logitech is involved in OEM relations with many computer and peripheral vendors. As digital communications keep getting more sophisticated, Logitech's staying ahead of the curve.

PHIL ZIMMERMANN
AUTHOR
PRETTY GOOD PRIVACY (PGP)

While we think it's reasonable to wish that Zimmermann had been more assiduous in his attention to the intellectual property issues involved in the use of RSA-patented algorithms, we salute his overall achievement in creating this free and widely distributed cryptography software. In an era of digital snooping and eroded privacy, PGP is a powerful leveller of the playing field for mere humans against technologically sophisticated snoopers.

We wish Zimmermann a speedy resolution of his legal difficulties with RSA (likely to be functionally resolved with a collaboration with an RSA-licensed third party) and the feds (currently taking the position that the software, available on US Internet sites from which it's globally accessed, is a "munition" subject to heavy export restrictions). ■



Top: Phillip White; bottom: Pierluigi Zappacosta.

ON THE HORIZON

PEOPLE AND COMPANIES TO WATCH IN 1994

•Kathy Kolder
Vice President of Business Development
Fry's Electronics

A cofounder and director of the renowned superstore chain, Kolder has gone from overseeing its day-to-day operations to her current role of strategic development, where she deals with issues ranging from sales promotions and strategic alliances to new stores. About which we expect to be hearing lots more.

An industry veteran, Kolder was selling S100 UNIX boxes in the early '80s to clients that included the Fry's grocery store chain. In the course of doing business with the supermarkets, she and John Fry got to discussing how people might like to shop for computers in a manner quite different from the then-prevalent direct-corporate-sales model—much, in fact, as they shop for groceries. And not in dull corporate surroundings either—the store should be entertaining. After all, says Kolder today, "Shopping is an entertainment factor—why do they have a piano player at Nordstrom's?"

Several unique shopping experiences (from the Western to the Egyptian) later, the success of the concept has been conclusively demonstrated. Today the superstore represents an ever-growing segment of the computer marketplace, and Kolder is a tireless speaker at trade shows and industry gatherings, educating vendors as to the necessity of being customer-driven in the retail marketplace, of tailoring their products and services to the individual end-user.

•General Magic

Scheduled to make its first substantial public statements and discuss actual products and technology at Macworld Expo, this Mountain View startup includes among its founders such luminaries as Bill Atkinson and Andy Hertzfeld of the original Mac team. They're hoping to have a similar impact with Magic Cap and Telescript, which are intended to provide unprecedented power and ease of use in the emerging personal communicator market.

It's too soon to tell what all this will mean, of course. But we'll be hearing lots more from General Magic in the coming months.

•John Sculley
Chairman and CEO
Spectrum Information Technologies

"This company is a gem and well positioned with unique technologies in the booming data transmission wireless world," said Sculley, who took over the helm of this small Manhasset, NY-based firm in October after his ouster as chairman of Apple.

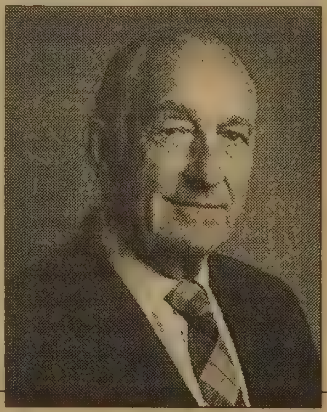
Conventional wisdom appeared to question Spectrum's prospects despite its patented data-transmission technology, citing prolonged losses and dubious stock practices. On the other hand, there's no doubt that the wireless world is booming, the virtual concrete is being poured for the data highway—and conventional wisdom didn't think much of a Pepsi executive in the computer business either.

END OF AN ERA AT HP

When 81-year-old **David Packard** stepped down as chairman of Hewlett-Packard in September, it marked the first time since the company's founding in 1939 that someone other than Hewlett or Packard was chairman.

Packard's contributions to the industry over that period (except for a period from 1969 to 1971, when he served as US deputy secretary of defense) have been all but incalculable—launched from Packard's garage in Palo Alto, the company was the archetypal Silicon Valley startup and pioneered an entrepreneurial culture. In addition to products from oscilloscopes to workstations, Hewlett-Packard introduced "The HP Way," a business philosophy that stressed fairness, respect for the individual, and concern for the community.

Three years ago, sensing a drift from the HP Way, Packard emerged from retirement to take an active hand in the company's direction. Now, with Hewlett-Packard once again in an aggressive leadership position and new chairman/CEO Lewis Platt (see main listings) clearly committed to taking the HP Way into the next century, we'd like to salute Packard for his innumerable accomplishments and wish him a long and happy retirement.



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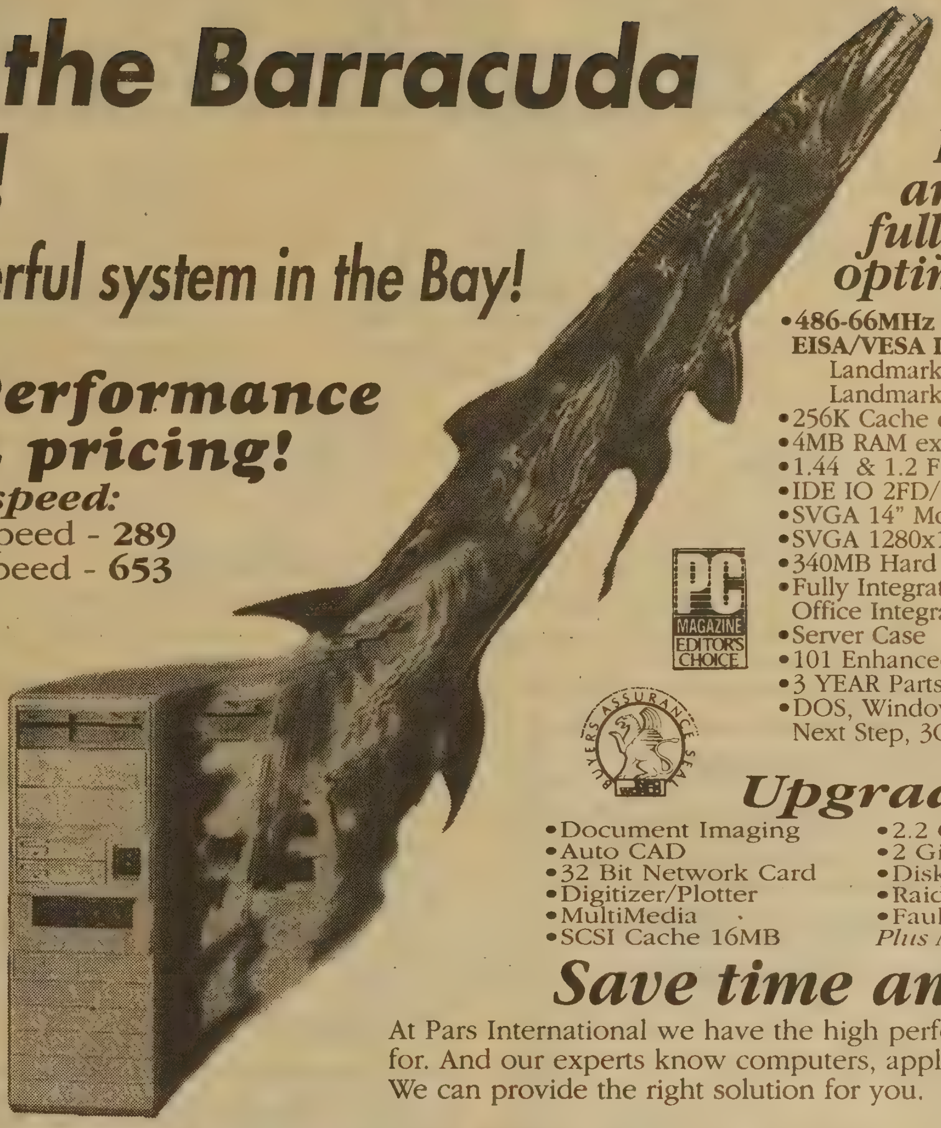

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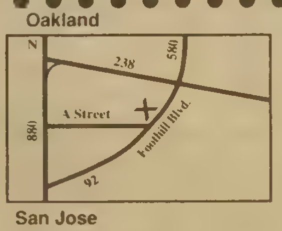

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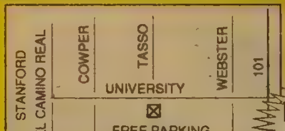

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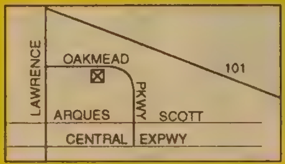

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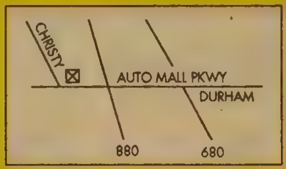

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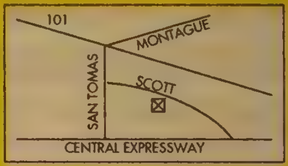

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tion, beyond 75dpi at least, is not going to result in greater readability on the screen. In some cases, depending on the actual image that was scanned, the surplus dots could only confuse the image and make it less legible.

"There is no maximum resolution for .MET files in Freelance. That's the nice thing about them. A metafile is literally a set of drawing instructions that Freelance would just follow, a script if you will. The display resolution is only restricted by your display driver, so the metafile, unlike the bitmap TIFF files, is completely device dependent. You should receive the same display in Freelance as you would see in the application that initially rendered it."

Since I have a video adapter and monitor that support 1280 x 1024 resolution under OS/2, metafiles might well be the solution.

Thus, I had three options, none ideal:

- Import 300dpi TIFF files and, if not legible, have Freelance print out transparencies for at least those slides which contained those figures; this would split the presentation into a slide and a transparency component.
- Find a way to convert the publisher's TIFF files to .MET format, and import them into Freelance; more effort, but hopefully no need for transparencies.
- Scan the book figures into a more suitable format/resolution; a waste, but the last resort if nothing else worked.

This article describes the TIFF alternative. Next month I will discuss the .MET and scan options.

TIFFED

I asked the publisher for 75-, 200-, and 300dpi TIFF samples to test. When imported into the Freelance presentation, the two low resolutions were not legible at all. The 300dpi figure was not great, but acceptable. Unfortunately, it turned out that this option was not feasible even if I were prepared to accept some transparencies,

I have 12MB RAM, hardly a low-end system. In a minimal configuration OS/2 itself can run in as little as 4MB of RAM. But while I am told that a basic standalone OS/2 configuration like mine should take about 6-6.5MB, it actually takes more than 9MB. Various tests and analyses notwithstanding, neither I, nor IBM, nor others on CompuServe have been able to figure out why. Thus, out of 12MB, I am left with less than 2.5MB of free RAM. Three basic utilities I use—MEMSIZE, WINBACK, and BLANKER (see last month's column)—consume almost 1.5MB, so only 1MB of RAM is free for applications. This makes swapping a certainty and, thus, performance slows down.

When the swapper file grows dynamically, fragmentation may occur, which further affects performance. To avoid this possibility, it is a good idea to set the initial swapper size such that it is just higher than what the largest size applications would require. With Freelance I noticed the swapper growing to about 15MB so I set the initial size to 16MB. But when I imported the TIFF files, I got a surprise.

Increasing the resolution of bitmap graphics steeply inflates file size. Thus, even at a low 300dpi, the TIFF files are 2MB+ each. Loading Freelance and a small presentation with just two or three of these files imported brought the system to its knees. The swapper grew to anywhere between 20MB and 54MB (fifty-four megabytes!) with nothing else running.

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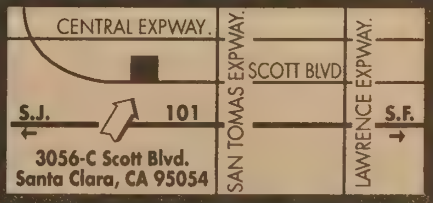

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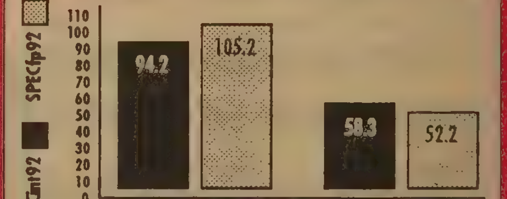

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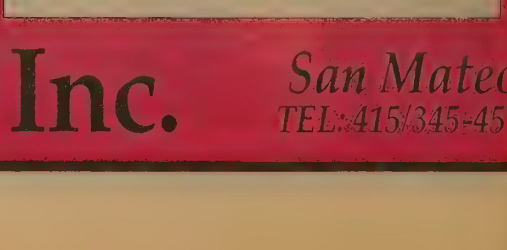

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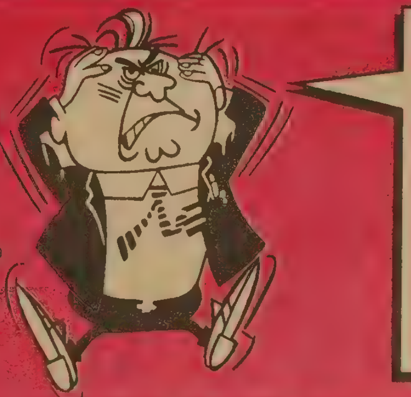

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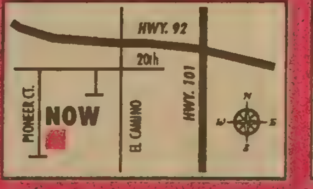

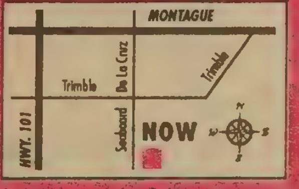

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Resizing an imported figure in one direction to fit the screen took about half a minute, a minimum of two minutes in all four directions. Loading the presentation seemed to take forever. Exiting the presentation and saving it also took minutes. With a seminar requiring two hundred slides or more, this simply would not work.

Since I had a caching EISA SCSI adapter with 4MB of cache, I wondered about these results. So I reported them to both IBM and DPT, the maker of the adapter, as well as to Lotus. Following several email exchanges and phone conversations, Lotus informed me as follows:

"Following our discussion with IBM regarding the large swapper file, what you are seeing is what you should be seeing. After looking at your presentation file, and the TIFF files that it points to, the amount of memory required to handle this information greatly exceeds that amount of physical RAM on your system. Even on my system, I generated a huge SWAPPER.DAT after reading the file in. I would also imagine that printing the file would result in even greater variances in the SWAPPER.DAT.

"The amount of data you are working with—a 9MB presentation file plus the 6.5MB of compressed TIFF files—means that there's a lot of information stored in memory when the data is read in. There really isn't much that can be done to alleviate this, other than adding RAM to the system. The performance issues you see when working with this file are also due to the memory usage, since a great deal of program code is being swapped out to handle the data in question."

But what about the hardware cache? Shouldn't 4MB help in such situations? A technical paper provided by DPT called "Hardware and Software Caching Combined" says, well, not really.

"[With operating systems such as OS/2, which do their own caching, the] software cache will always perform better on read hits than a hardware controller cache since the software cache is closer to the application requesting the data. DPT's caching controllers are specifically designed to work in [such environments that] are already software cached. Although software caches are almost always beneficial, in larger, more heavily loaded systems, hardware caching offers a significant advantage when combined with the software cache in the operating system.

"The primary purpose of the OS' software cache is to eliminate disk reads. If the data requested by the application program is found in the software cache, then a disk read is eliminated. A second strategy used in software caches is to postpone writes to disk by holding the data in cache until a time when there is no disk activity. On the other hand, the primary purpose of a caching controller is to find ways to increase the throughput for the disk I/O that does get through from the software.

"Software write caching typically provides sufficient performance for lightly loaded systems with small numbers of users (six users or less), but will experience performance degradation in larger multi-user environments with heavier loading...[in such situations hardware]

continued on page 297

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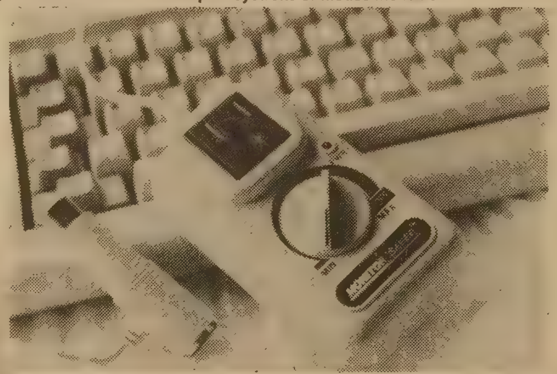

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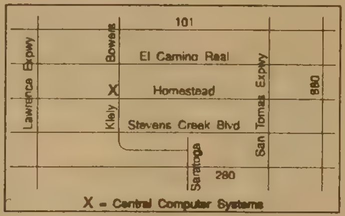

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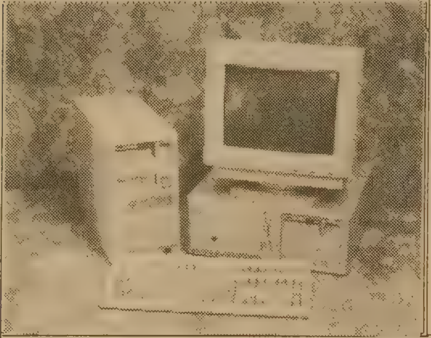

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105MB 3.5" w. cartridge (IDE host adapter)	365

TEAC (Floppy Drive)

1.2MB 5.25" / 1.44MB 3.5" w. frame	48/42
2.8MB 3.5" w. frame	85
Dual Floppy 1.2MB & 1.44MB	108

7. I/O CARDS

BOCABoard w. cable 4 / 8 / 16 port	99/149/299

KOUWELL

2S 1P 1G w. NS16550 chipset (XT, AT)	49
4 Serial ports card	69
AT I/O (2S 1P) / AT I/O (2S 1P 1G)	27/27
AT I/O (2S 2P) / AT I/O w. IDE (2S 1P 1G)	33/34
Printer card (2P) / Serial card (XT, AT)	15/15

QUICKPATH

13 port I/O w. 4-16550UARTs + Extd. IRQs (2 IDE, 4F, 4S, 2P, 1G)	125
4-serial, 16550UARTs, 8addr, 10 IRQ (3,4,5,7,9,10,11,12,14,15)	99

STB 4-COM

4 serial, 16 bit, w.16554, support COM 1-8, IRQ 2,3,4,5,10,11,12,15	109

SIIG

2S 1P w. 16550 chipset	49

WONDER SYSTEMS (USA made)

4S 3P (16 bit, 8IRQ, 16550 FIFO)	135

8. KEYBOARDS

ANCER (Black)

101 key	42

FOCUS

FK2001 101 click	42
FK9000 129 keys Programmable	65

NORTHGATE OMNI

101S / 101NI / 102	55/69/69
Ultra T or F	95

SIIG (click)

Suntouch 101 / Suntouch Jr. 84-key Mini	49/45

OTHERS

BTC 84-key Mini	37
KeyCat II 101 w. trackball mouse	65
Keytronic 101	37
New Maxi / Maxi 101 / Maxi Key 124	29/35/59
Mitsumi 101	30
PT505C 101	25

10. MEMORY CHIPS

DRAM

1 MB x 1 - 80 ns	6.20
64K - 100 ns / 256K - 80ns.	1.39
64K x 4 - 80ns / 256K x 4 - 80ns.	1.65/5.30

SIMM

16 MB x 9 - 70 ns	779
4 MB x 9 - 60 / 70 ns	145/138.5
1 MB x 9 - 60 / 70 / 80ns (3 chips)	38.5/37.5/37
256K x 9 - 70 / 80 ns	14/13
1 MB x 36 - 60 / 70 ns	195/185
4 MB x 36 - 60 / 70 ns	629/609
SIMM Mac : 4 MB x 8 - 70 / 80ns	135/129

SIPP

1 MB x 9 - 70 ns (3 chips)	43

COMPUTER MEMORY (3rd Party)

for current prices	call

KINGSTON MEMORY for

Apple, AST, AT&T, Compaq, IBM, NEC,Sun	call

NOTEBOOK / LAPTOP (3rd Party)

for current prices	call

LASER PRINTER MEMORY UPGRADE

Jet Ram (3rd Party):

EPSON EPL 6000	
-- 2MB/ 4MB	114/175
HP	
- Deskjet 500/500C -- 256K	75
- Laser Jet II/ IID	
-- 1MB / 2MB / 4MB	99/145/235
- Laser Jet III/ IIIP/ IIID	
-- 1MB / 2MB / 3MB / 4MB	79/125/169/215
- Laser Jet 4 / 4M	
-- 4MB / 8MB / 16MB	199/389/699
PANASONIC	
- KX-P4410/ 4430	
-- 1MB / 2MB / 4MB	95/139/229
- KX-P4420/ 4450i	
-- 1MB/ 2MB/ 4MB	99/145/235
- KX-P4450 --1MB	139
- KX-P4455 --2MB	169
QMS	
- P-S 410 -- 1MB / 2MB / 4MB	99/145/235
- P-S 815/ 825 -- 2MB / 4MB	159/249
TEXAS INSTRUMENTS	
- Micro Writer --1MB	69
- MicroLaser Turbo XL -- 1MB	69

PACIFIC DATA:

Pacific 4 for HP IIP+/ IIIP/ III/ IIID	
-- 1MB / 2MB / 4MB	89/135/225
1-2-4 Plus for HP II/ IID	
-- 1MB / 2MB / 4MB	115/159/249
Pacific 4 SIMM for HP 4/ IIISi/ XL300	
-- 4MB / 8MB	199/389
ProTracer -- 5MB / 8MB	375/525

11. MODEMS & FAX

Adtech 144/144 Pocket	229
ASAP TF-333 Phone & Fax Auto Switching	89
National Semi TyIN 2000 Answer/Fax	145

E-Tech

Ufomate Pocket Fax modem (w. Win/DOS s/w)	
- P9696MX	159
- P1496MX	189
- P1414MX (Distinguish ring & Called ID)	225

GVC

14.4 Fax Modem Int / Ext	145/165
PCMCIA 144 Fax	145

HAYES

Accura 2400 Int / Ext	49/75
Accura 96 + Fax Int / Ext	199/229
Accura 14.4 + Fax Int / Ext	215/245
PCMCIA Optima 14.4 Fax	325
Pocket edition 2400 w. Smartcom EZ.	129
Optima 144 Ext + Fax 144	389

SmartCom for Windows	47
V-series SmartModem 9600 v.42, MNP5 Ext	499

INTEL

Faxability Plus/OCR for Win 2.0	95
New Fax Modem 24/96 Int	55
New Fax Modem 24V/96 v.42bis Int / Ext	119/129
New Fax Modem 96 Int / Ext	155/165
New Fax Modem 14.4 Int / Ext	169/189
PCMCIA 14.4 Fax Modem	315
SatisFaxtion modem (w. FAXability s/w)	
- 100 Int send96 rec.48, 2400 modem	99
- 200 Int 96/24 v.42, MNP5	245
- 400 Int 144/144 v.42, v.32bis, MNP5	279
- 400e Ext 96/14.4, 4K data buffer	(299)325

MEGAHERTZ

PCMCIA 14.4 Fax modem / w. X-Jack	325/345
PCMCIA 96/24 Fax modem w. X-Jack	225
P2144 Pocket 14.4/14.4	325

PRACTICAL PERIPHERALS

PM14.4FX14.4 Int	205
Pocket 14.4 Fax Modem	369
Mini Tower 14.4FX14.4 Ext	225
PM2400 Mini fax modem	89
FaxMe (turn HP Laser to Fax receiving)	129

SHIVA

Net Modem/E Ethernet BNC/TP	1475

SIIG

TeleCommunicator 10-in-1 Fax Modem	229

US ROBOTICS

Courier 16.8 Int / w. Fax	459/499
Courier 16.8 Ext / w. Fax	495/545
Courier Terbo Fax 19.2 MB w. ASL	(425)525
Sportster 14.4/14.4 FAX MNP5 Int/ Ext	159/179
Sportster 14.4/14.4 Fax for Mac Ext	199

ZOLTRIX

2400 baud modem w. MNP5 Int	39
96/24 send & rec. fax/modem w. MNP5 Int.	69
96/24 fax/modem v.42, MNP5 Int	85

ZOOM

AFC Int / AFX Ext	55/69
9624 w. WinFax Lite Int / Ext	75/79
96/96 w. WinFax Lite Int / Ext	135/165
144/144 w. WinFax Lite Int / Ext	149/179

ZY-XEL

U1496B 16.8 voice 14.4 Fax WINs/w Int	315
U1496B+ upgradable to 19.2Kbps Int	425
U1496E 16.8 voice 14.4 Fax WIN, LED Ext	319
U1496E+ upgradable to 19.2Kbps Ext	429

12. MONITORS

Monitor Saver	45

EMC

EM 1412 14" Mono amber, 90-260v	95
EM 1417 14" 1024 x 768 VGA Mono paper white	119
EM 1428 14" 1024x768 .28, 90-260v	269
EM 1439G 14" 1024 x 768 .39	219

HITACHI

CM2095 20" 1280 x 1024, .31 w/0 cable	1325
CM2187 21" 1600 x 1280, .31 w/o cable	2045
Accuvue PS20 20" 1600 x 1280, .28	1695
Accuvue PS21AM 21" 1600 x 1280, .28	2395

MAG (Auto Switch Power Supply)

MX15F MPRII 15" Flat 1280x1024 .28, NI	495
MX17F MPRII 17" Flat 1280x1024 .26, NI	925
Mac Adapter	25

MITSUBISHI

HL6955SETK 20" 1280x1024 .31, NI	1745
TFS 6705 Diamond Pro 17" 1280x1024 .26 NI,Trinitron, MacII, 100-240v	1045
BNC Cable	39

NANAO (100-240v)

F340iW 15" Full Flat screen,1024x768 .28	529
F550iW 17" 1280 x 1024 .28, NI, Mac	1165
F560iW 17" 1280 x 1024 .26, NI	1379
F550i 17" 1280 x 1024 .28 NI, Mac	955
T560i 17" 1280x1024 .25, NI, MacII	1675
T660i 20" 1280x1024 .31, NI, Trin. , MacII	2395
F750i 21" 1280x1024 .31, NI, MacII	1895
MacII cable adapter	69

NEC (120v)

3FGe 15" 1024x768 .28, Mac	589
3V 15" 1024x768 (new)	549
4FGe 15" Flat 1024x768 .28, NI, Mac	689
5FGe 17" 1024x768 .28 NI (no Accu color)	1075
5FGp 17" 1280x1024 (new)	1399
6FG 21" Flat 1280x1024 .28. Mac	2395
6FGp 21" 1280 x 1024 (new)	2399
NEC Monitor Lens (Anti-reflection, Anti-static)	
- for 4FG / 5FG / 6FG (special)	(65)/(105)/185
FG / MacII cable adapter kit	19.50

NOKIA

447B 17" 1280x1024 .25 / TCO	1095/1255
445M 21" 1600x1280 .26 / TCO	2099/2299
445X 21" 1600x1280 .26	2699

SAMSUNG

CSK5577L 15" 1024 x 768 .28 NI	445

SEIKO (90-132v)

CM2050 20" 1024x768 .31, NI, Mac	1395

SIIG

9" VGA Mono paper white 640 x 480	135

Standard Technologies

400-M VGA Paper white	119

SONY

1430S 14" 1024x768 .25, NI, 120v	599
17SEI 17" 1600 x 1280 .25	1295
1730 17" 1024x768 .25, NI	995
2038 20" 1280x1024 .30, NI	2195

VIEWSONIC

4e 14" 1024x768 .28, Int,110/220v	279
5+ 14" 1024x768 .25, NI, MacII	475
6e 14" 1024x768 .28, NI.	299
15 15" 1280x1024 .28, NI, Mac II	449
17 17" 1280x1024 .28, NI, Mac II	1035
20 20" 1600x1280 .28, NI, Mac II	1695
21 21" 1600 x 1280 .26 NI, Mac II	1895
Mac cable adapter	35

13. MOTHERBOARDS

386-40 128K cache w. cpu / w/o cpu	169/119
486-33 128K ISA (no cpu) / 256K	125/139
486-DX2-66 256K VLB w. Zip socket (no cpu)	149

AIR (w/o cpu)

486-33 / DX2-66 256K, 3VLB slots	215
486-33 / DX2-66 256K EISA, 3 VLB slots	425

AMI

Super Voyager 486-33 256K VLB, 8 slots	795
Super Voyager 486 DX2-66 VLB, 8 slots	995
Super Voyager II 486-33 256K VLB, 7 slots	645
Super Voyager II 486 DX2-66 VLB, 7 slots	865
Enterprise III 486-33 256K VLB EISA	875
Enterprise III 486 DX2-66 VLB EISA	1095
Enterprise IV 486-33 256K VLB EISA	769
Enterprise IV 486 DX2-66 256K VLB EISA	999

IBM

486SL-C2-33 / 66 16K internal cache ISA v.2 w. CPU & Math Processor	279

LYNX (made in USA, w/o cpu)

486DX - 33 / 50 / DX2-66 256K VLB	149

MICRONICS

386SX-20 Phoenix BIOS (32MB max)	175
386-33 64K cache Gemini (32MB max)	299
486-33 Local Bus w. 256K cache	635
486-DX2-50 VLB w. 64K	595
486-DX2-50 VLB w. 256K	695
486-DX2-66 Local Bus w. 256K cache	845
JX30 486-DX2-66 VLB 256K w. Zip socket	920
486-33 256K EISA VLB	845
486-50 256K cache EISA E2	1095
486-DX2-66 256K EISA VLB	1045
16MB Memory Card	150

NICE (w/o cpu)

PCI 586-60 256k w. 3 PCI slots	1645
486-33 / DX2-66 256K VLB	215
486-50 / DX2-66 256K Mini EISA VLB	265
486-50 / DX2-66 256K EISA VLB	425

QUICK-PATH

486-50 w. 64K cache, 15ns ISA (no cpu)	195

14. MOUSE & JOYSTICK

AGILER

AGM-600E Serial 400 dpi	23.50
ATB-610 Serial Trackball	24.50
Keen	12.50

ANCER (black)

3-button	25

APPOINT (portable)

MousePen Pro	49
Thumbelina	49

KENSINGTON

Bus 4.0	119
Expert serial & trackball 4.0	99

LOGITECH (call for rebate info.)

Cordless II (new)	85
Cyberman 3D controller	85
Dexxa Serial / First Serial	27/37
Easy Touch	209
Fotoman Plus Camera for PC & PS/2	539
Mouseman Bus / Serial	59/54
Trackman Portable / Trackman II	89/75

MICROSOFT

Mouse 2.0 w. WIN 3.1	149
Ball Point (portable)	119
Bus 2.0 (oem) / w. Bus Card	46/69
Bus 2.0 w. Expansion Card	89
Serial 2.0 (oem)	45
Serial 2.0 w. PS/2 port (special)	(65)
Serial 2.0 w. 9 to 25 pin adapter (special)	(59)

MOUSE SYSTEMS

New Point (trackball for laptop & PC)	45
Little Mouse PC (2 button optical) serial	29
Omni (2 button) MS compatible	25
PC Mouse (3-button optical)	59
PC Trackball II	55
Page Brush - color scanner (special)	(199)399
Serial Bus Card (9 IRQs)	29
The New Mouse 400CPI (3 button)	45

JOYSTICK :

Gravis Game pad	26
Warrior 5, Quick shot	14.50
Adapter kit	16.50

THRUSTMASTER

ACM Gamecard	29
Flight Control System / Pro	68/114
Flight Stand - Holder	19
Rudder Control	115
Weapons Control MK II (special)	(99)

15. NETWORK

MAILMAN 2.0 (10-user for Novell NetWare)	(99)

3COM

3C503 8 bit coax / TP ethernet	179/199
3C503-16 Etherlink II 16 bit coax / TP	169/179
3C507 16 bit Ethernet coax / TP	289/299
3C509 Etherlink III coax / 5 pack	119/535
3C509 Etherlink III TP / 5 pack	115/525
3C509 Combo / 5 pack	145/595
3C579 Etherlink III EISA coax / TP	235/239
3C529 Etherlink III for MCA / TP	245/249
3C621 Link Builder 10 BT (12 port)	699
3C16270 Link Builder TP (12 port Hub)	395
TokenLink III 16/4 ISA/ MCA/ EISA	435/495/645
3C551 Link Watch SNMP/NLM software	259

ADDTRON (Novell compatible)

AE-200LC 8 or 16 bit BNC & TP	69
AE-200LT 8 or 16 bit TP only	62
ET-200STS NE2000 coax compatible	65
AE-200STA NE2000 3 in 1 Combo	75
Starter Kit for Novell Lite 1.1 / for Win	245/265
Starter Kit for Lantastic AI DOS / WIN	275/315
Transceivers : ET10TB (TP<-->AUI)	45
Transceivers : ET10CB (BNC<-->AUI)	45
HUB : UTP8 (8TP + 1BNC)	215
HUB : UTP16 (16TP + 1BNC + 1AUI)	485
Pocket Adapter : BNC / TP	135/139
Boot PROM	15
Arcnet :	
- Arc120TP 8bit Combo	59
- Arc220TP 16bit Combo	69
- 8 port active Hub coax / TP	135/145
Token Ring - 16/4 ISA / MCA	379/399
Token Ring - Mau 1 / Mau 3	295/295

ALLIED TELESIS (CentreCOM)

AT-1500T TP / AT-1700T	79
AT-1500BT / AT-1700BT (TP+BNC)	99
Transceiver MX10 / 210T	45

ARTISOFT (Lantastic)

AE-2 Ethernet starter Kit v5.0	449
AE-2 Ethernet starter Kit v5.0 WIN	509
AE-2 Ethernet adapter	195
AE-3 Ethernet adapter / NR2000A	225
2Mbps starter kit DOS / WIN	355/415
2Mbps 1-user kit / for MCA	139/215
AE-2/T 16bit 10Base-T adapter	199
64K RAM upgrade for AE-2, AE-3 adapter	45
AI software v5.0 DOS / 6 pk / 12 pk	85/395/720
AI software v5.0 WIN / 6 pk / 12 pk	99/535/975
AI Starter Kit NR-SI 2000C DOS / WIN	349/379
Articom - LAN modem sharing s/w	279
Central Station Connectivity Processor 5.0	399
Ethernet s/w kit 5.0 w. cable DOS / WIN	79/139
Lantastic Z (2 stations) v5.0	89
Lantastic for Netware (Network O/S)/ v5.0	99/275
Lantastic for Mac s/w Kit	339
T - Runner 8 Port Hub	320
T - Runner 12 Port Hub	520
Lantastic for TCP/IP single / 5-user	185/760
Lantastic Print Server Station Ware	69
Network Eye - Remote Control Access	155
NR 2000C (BNC only) / Starter Kit Win	172/469
NR 2000T (RJ 45 only) / 6 pk	175/979
NR 2000 MCA	255
NR-SI 2000C / 2000T (special)	(99)
NR-SI 2000A Combo / 2000M	119/165
Peer-Hub 10Base-T concentrator	270
Remote Boot ROM for AE-2, AE-3, NR2000	45
Sounding Board adapter Kit	69
StationWare (Dial Up Connection)	69

ASANTE

Network products	call

CASTELLE

JetPress (Network Print Server) for HP II,IID,III,IIID, coax / TP	429
LANPress (Print Server) connects up to 4 printers	
- Ethernet Thick/Thin coax (1P 3S)	475
- Ethernet Thick/Thin coax (2P 2S)	625
- Ethernet 10BaseT (1P 3S) / (2S 2P)	475/635

CC:MAIL

cc:Mail DOS platform v4.0	199
cc:Mail WIN platform v2.0	335
cc:Mail 10-user / 25-user pack	239/579
cc:Mail Gateway v3.21	859
cc:Mail FAX v1.2	1350
cc:Mail Remote	199
cc:Mail Router 4.0	875

COMPULAN

Arcnet	
- 4-port Arcnet Passive Hub	19
- 8-port Coax Stackable Active Hub	149
Ethernet	
- 8 bit E100 coax / ET500TP	55
- 16 bit E200 coax / ET600TP	65
- Boot Prom (for E100/ E200/ E500/ E600)	19

D-LINK

DE-205 TP : 4 Port Hub + 16 bit card	295
DE-220 TP 8 or 16 bit (special)	(99)
DE-600 Coax Pocket Adapter (special)	(199)
DE-650 PCMCIA Coax / TP	195/199

FARALLON

PN381 PhoneNet w.Timbuktu for WIN	259

GATEWAY COMMUNICATION

G/Ethernet 16 coax / 32 bit (special)	59/199

IBM

PCMCIA for Token Ring 16/4	479
PCMCIA 10B2 / 10BT	215/195

INTEL

EtherExpress Flash LAN Adapter combo	(135)
EtherExpress 16 coax / 5 pk	(115)/495
EtherExpress 16 TP / 5 pk	(117)/499
EtherExpress 16 MCA / 16 MCA TP	175/185
EtherExpress 32 EISA	439
12 port Hub EtherExpress ISA / EISA	565/645
LAN Protect 1.5 (virus protection)	685
LAN Sight 3.0 Netware Utility / Monitor	299
LANSpool s/w 386 NLM v3.5A	425
Netport II Thin & Thick / 10BT	395/399
Netport Express XL	465
NetSatisfaxtion v2.5 (s/w for NOVELL)	955
TokenExpress 16/4 ISA/ EISA/ MCA	435/655/475

LANPRO

8 Port ER5390 HUB : (8TP + 1BNC)	189

NOVELL (Eagle)

EP2000 Coax / TP (new)	99/89
NE2000 plus coax ethernet / 5 pk	119/525
NE2000-TP plus TP ethernet / 5 pk	105/475
NE2000 Netware Lite starter kit / Win	355/375
NE2000 Plus Combo / 5 pk	135/550
NE3200 Eagle EISA w. TPA	545
NE3210 EISA 32bit Combo (ws)	215
Microdyne NE2000 5 pk	499
NTR 2000 Token Ring	435
EPROM for NE2000	35
Print Server NPE400	350
Netware Lite 1.1 + DR DOS 6.0	65
Netware Lite w. Win Utilities	75
Netware 3.12	
- 5 / 10 / 25-user	625/1395/2095
- 50 / 100 / 250-user	2795/3995/6995
Netware 4.01	
- 5 / 10 / 25-user	825/1825/2625
- 50 / 100 / 250-user	3595/5495/9695

SMC (Western Digital)

8003 Plus Elite 8 bit coax	115
8013 Plus Elite 16 coax / 6 pk	125/625
8013 Plus Elite 16 TP / 6 pk	127/629
8013 Elite 16 combo / 6 pk	149/775
8013 Plus/A for MCA / TP	195/199
8033 Elite 32 bit coax / TP	595/599
Elite Ultra 16 coax / TP / combo	110/112/129
Netware Boot ROM for ethernet	34
8 Port Concentrator (8TP+1AUI)	349
12 Port Concentrator(12TP+2AUI+1BNC)	595
Token Ring 16/4 ISA / MCA	279
Token Elite Passive MAU 8 / MAU 16	415/599

SYNOPTICS

Network products	call

XIRCOM

PCMCIA CE-10B2 BNC / CE-10BT	275/279
PCMCIA CE-10BC Combo	315
PE3-10B2 coax pocket adapter	285
PE3-10BT TP pocket adapter	289
PE3-10BC Combo pocket adapter	325

CABLES & ACCESSORIES

Twisted pair cable, TP 4-pair, PVC, Level 3	
- 1000' / 500' / 200'	89/55/35
10 BASE-T cable, 1000' Level 3 plenum	165
RG58 cable, 500' / 1000'	65/109
Belden 8259, RG58, 1000'	165

16. POWER SUPPLIES

Tele Power	55

AMERICAN POWER CONVERSION (UPS)

APC-400 Smart-UPS (286, 386 WS)	289
APC-600 Smart-UPS (386, 486 FS)	359
APC-900 Smart-UPS (386, 486, FS & WS)	569
APC-1250 Smart-UPS (multiple FS & WS)	699
APC-400 Back-UPS 286, ps/2, 386	179
APC-450 Back-UPS 286, ps/2, 386	215
APC-600 Back-UPS 286, 386 FS	285
APC-900 Back-UPS	395
APC PowerChute Plus :	
- for Novell	69
- for OS/2, Lan Server, 3 Com	75
- for UNIX / XENIX	99
Power Doctor (DOS) I/F Kit for Smart-UPS	79
Surge Arrest unit	call

GENERAL

250W for Baby AT / Baby or Mid Tower	45
250W for AT / for Full Tower	47/49
300W for Full Tower	69
550W for UPS	279
1200W for UPS	659

PC POWER COOLING

Standard 220 for desktop / full tower	85
Silencer 270	
- for slim (baby or mid tower)	149
- for AT desktop / full tower	165/165
Turbo-Cool 300	
- for slim (baby or mid tower)	149
- for desktop / full tower	175/175
Turbo-Cool 450 for desktop / full tower	325

TRIPP LITE

Isobar 4	49
Isobar 6	55
Isobar Console CCI6 plus w. RJ11	85
Isotel 4 w. RJ11	58
Isotel Ultra 6 w. RJ11	65
UPS Monitoring Board for NetWare	59

17. NOTEBOOK

MITAE

Mono 486SX-25 w. 4MB, 130MB HD	1295
Passive Color 486SX-33 w. 4MB,130MB HD	1795

18. PRINTERS

BROTHER

HJ-400 Desktop Ink Jet for PC or Mac	295

SEE MORE ON THE NEXT PAGE

CANON

BJ-200 InkJet	319
BJ-300 desktop	349

CITIZEN

GSX 145 (24 pin, 132 column)	355
- Color Option for GSX 145 / for GSX 130	65/45
GSX 230 Fonts & quiet (rebate $40)	229
GSX 240 Scalable Fonts & quiet (rebate $40)	285
PN48 notebook, 1ppm, 2lb, battery, case	299

HP (HEWLETT PACKARD w. toner)

Desk Jet 500 / 500C / 550C	295/395/585
Desk Jet 1200C / Postcript	1375/1975
Jet Direct 10BT	429
Laser Jet 4 / 4M / 4L / 4ML	1349/1865/669/999
Laser Jet 4P w. 2MB / 4MP (new)	975/1375
Laser Jet 4Si / 4SiMX	2995/4295
Paint Jet / Paint Jet XL300	695/2295
Accessories :	
- Optinal 500 sheet Legal Letter A4 (Jet 4)	279
- Envelope Power Feeder 75 sheet (Jet 4)	279
- Legal, Letter or A4 250 sheet Tray (Jet 4)	99
- Legal, Letter or A4 500 sheet Tray (Jet 4)	109
- Lower Cassette w. letter tray for IIP, IIIP	149
- Toner for Jet II, III	79
- Toner for Jet IIP, IIP+, IIIP	66
- Toner for HP4 / 4L	109/69
- Postcript for Jet 4	359

LASER MASTER

Utility XL1200 / XLT / XLO	4795/6495/7995
Win Printer 800 (Postscript)	1075
Win Printer XL600 11x17, 600x660PPI	2350
WinJet 1200 Postscript for HP 4 (special)	(650)

MICROTEK

TrueLaser MTP-306 6ppm, 2MB, 35 fonts	995

PACIFIC DATA PRODUCTS

ProTracer Inkjet, A to C size output, 360dpi, I960RISC processor, 512K, 45dBA	985
- Postscript emulation card	375
- HP-GL emulation Card	315
- Sheet Feeder I / II	135/115
- Ink Cartridges	19.50
Pro Tracer HP GL Bundle w. 5MB	1395

PANASONIC

1124i / 1624	259/379
- Auto Sheet Feeder for 1124 KX-P36	120
2023 24pin, quiet printer	199
2123 24 pin, 43.5dBA, color capability	239
2124 24 pin, 43.5dBA, color capability	319
2624 24 pin, quiet printer, 46.5 dBA	399
2180 9 pin, 45 dBA, color capability	169
1150 9 pin, 55 dBA,	139
Color upgrade Kit KX-PCK11	55
Single bin cut sheet feeder KX-PT10	95
32K Buffer dot matrix printers KX-P43	65
Serial interface card PS-13	75
4410 Laser, 512K, 5ppm	559
- Corona KX-PCR3	49
- Developer KX-PDP4 / KX-PDP5	110/125
- Drum KX-PDM4 / KX-PDM5	99/109
- Extra cassette KX-PKC2	45
- Fuser unit KX-PFS5	105
- Optional second cassette KX-P495	135
- Toner KX-P453	42
- Fonts Card KX-P47x (for Lasers)	95
4430 Laser, 1 MB, 5ppm	675
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4420 Accessories	
- Developer KX-PDP2	95
- Drum KX-PDM2	99
- Envelope Tray KX-P431	59
- Legal Tray KX-P425	45
- Ozone Filter KX-PFT2	29
- Toner KX-P451	42
4450 & 4450i Accessories	
- Developer KX-PDP1	95
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- Envelope Tray KX-P430	59
- Legal Tray KX-P420	45
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- Toner KX-P450	42
4455 Postscript, 11ppm	1695
- others same as 4450i	

QMS (Adobe Postscript)

QMS-PS 410 4ppm, 2MB, 45 Fonts	995
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- Toner	95

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Printers	call

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Pacific DirectNet (for Novell & UNIX)	499
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Plotter in a Cartridge P.E.	
- for HP IID, IIP, IIP+, III, IIID, IIIP	225

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MICROTEK

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TAMARACK

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- w. Pub.L.E. &OCR 600/800/1200 dpi	895/1095/1745
- w. Photostyler 600/800/1200 dpi.	995/1195/1845
- w. PhotoShop 2.5 600/800/1200	1045/1245/1895
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- Bundle w. PageMaker 5.0	559
Z-Nix Cordless Super Mouse	(59)

20. TAPE BACKUP

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- KE-09 Ext Kit w/o controller	75
- TC-15 controller w. data compression	179
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Graphics Ultra Pro 2MB EISA	425

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Stealth 24 1MB DRAM VLB	169
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Stealth Pro VRAM 2MB / VLB	349/359
Viper VLB P9000 VRAM 2MB	395

MEDIA VISION

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NUMBER NINE (TI34020)

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III SOFTWARE

1. CD SOFTWARE

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Game Bonanza + Antivirus
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Giga Games (3000 files)
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Learning Heaven
Megabi Monster
Mixed-up Mother Goose
Multimedia Computer Tutor
Nature Graphics
Peter and the Wolf MPC
Sleeping Beauty MPC
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So Much Shareware II
Straight from Heaven   Stellar 7
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Mavis BeaconTeaches Typing MPC
New View for Space
Publish It 2.0 DOS
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The Animals MPC
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Who Kill Sam Rupert
Wing Commander w. Ultima 6

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- Mud Paddle
- Paper Bag Princess
- Tale of Benjamin Bunny - Tale of Peter Rabit
- The Scary Poems for Rotten Kids
- Thomas Swimsuit
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Game Platimium for Win
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Newsweek Interactive
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Resource Language Operation
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Eclipse Fax 1.1 for WIN / w. OCR	69/85
Energizer Bunny screen saver	15
Fastback Plus 6.0	99
- Fastback Plus 3.1 for Win	107
Faxit DOS & WIN	69
Fax Master for WIN	*(69)
File Maker Pro 2.1 for WIN	*(125)259
Font Minder for WIN	55
Fractal Design Painter 2.0 WIN / X2 WIN	255/75
Frame Maker 4.0	549
- upgrade	189
FTP : PC/TCP for DOS / WIN	345
Geoworks Pro	119
GDI : Flash Form / Wind Form	55/65
Grammatik V for DOS / WIN	57/59
Hardvard Graphics 2.0 WIN / Upgrade	*(265)/89
Hardvard Graphics 3.06 DOS	375
Hijaak 2.1	95
- 2.0 for Windows	85
Hollywood for WIN	*(39)
IBM DOS 5.0	39
IBM PC DOS 6.1 oem / reg.	49/115
IBM OS/2 2.1 / CD version	149/135
- upgrade / CD version	99/85
- OS/2 for Windows	49.95
IIT XtraDrive 3.0 (data compression)	65
Intermission screen saver for Win	29
Johnny Castaway screen antics	19
LapLink V	105
- upgrade	55
LapLink V Netware	145
Mac-In-DOS for WIN	99
Mac Print	65
More Font	77
My Invoices	16
My Product Invoices	45
My LabelMaker	16
Advanced Label Designer	35
My Mail List	16
Advanced Mail List	35
My Quick Writer / My Back Up	16/16
Omni Page Professional WIN 2.1	(479)599
Pacioli 2000	*(10)
Peach Tree Accounting 2.0 for WIN	115
PFS : Publisher for WIN	43
Power Basic	95
Power Japanese for Win	225
Power Search (file manager)	39
PrintShop Deluxe 1.2 for Win / Business	49/27
Procomm Plus 2.1	69
- 1.02 for Win	95
QA Plus 4.7	85
- for Windows	89
Quark X Press 3.1 for WIN	559
Qualitas 386 Max 7.0	63
Right Writer 5.0 / for WIN	29
SpinRite 3.1 (new)	79
Stacker 3.1	95
- upgrade	55
- for OS/2	125
Stage Soft Accounting	125
- w. Payroll	159
- Lan version	285
Star Trek screen saver	35
Superstor 2X / Pro 2X	49/79
Time Slip v.5.0	169
- for Windows	189
This is My Computer	8.50
Trio Data Fax	45
Turbo CAD v3.0 w. free 500 drawing symbols.	85
- Professional for Win	219
Turbo Tax Headstart State DOS / WIN	23
- Headstart 1040 DOS / WIN	43
- Turbo Tax + Quicken for Win	59
T-Value 3.0 (interest, loan)	59
Uninstaller 2.0 (Microhelp)	45
Unixware Personal Edition (CD ver)	175
Ventura Publisher 4.1	499
- 4.1 Node	285
- Education special	185
Vista Pro v 3.6	69
VISIO for WIN 2.0	*(125)199
Wave for WIN	75
Winfax Pro 3.0	79
WinSense (windows optimizer)	49
Winsleuth Gold Plus	59
XTree Gold 3.0	95
XTree for WIN 1.5	65

HAPPY HOLIDAYS • ☺☺

■

RESOURCES

Calendar Of Events

CONFERENCES, SHOWS, AND OTHER SPECIAL EVENTS

JANUARY

January 2 Computer Show & Sale. Santa Clara County Fairgrounds. Richard James. Call: 1-800-685-1400.

January 2 The Computer Show And Sale. Cal Expo, Sacramento. MarketPro. Call: (415)388-8893.

January 5–8 MacWORLD Expo. San Francisco. Smith & Shows. Call: (617)361-8000.

January 8 The Computer Show And Sale. Sonoma County Fairgrounds, Santa Rosa. MarketPro. Call: (415)388-8893.

January 9 The Computer Show And Sale. Conference Center, South San Francisco. MarketPro. Call: (415)388-8893.

January 16 The Computer Show And Sale. Solano County Fairgrounds, Vallejo. MarketPro. Call: (415)388-8893.

January 17 & 18 Worldwide Electronic Commerce: Law, Policy, And Controls Conference. New York. MultiCorp. Call: (214)516-4900.

January 17–21 USENIX Winter 1994 Technical Conference. San Francisco. USENIX. Call: (510)528-8649.

January 18 Free Lecture By W. Richard Stevens On The Future Of TCP. San Jose. Computer Literacy Bookshops. Call: (408)435-1118.

January 18–21 Client/Server Conference And Exposition. San Jose. CMP Conference & Exhibit Group. Call: 1-800-972-5244.

January 20 Speech By Borland International CEO Philippe Kahn: Strategies And Tactics In The Computer Software Industry. San Francisco. Commonwealth Club. Call: (415)597-6705.

January 22 Computer Show & Sale. Santa Clara County Fairgrounds. Richard James. Call: 1-800-685-1400.

January 23 The Computer Show And Sale. Scottish Rite Center, Sacramento. MarketPro. Call: (415)388-8893.

January 24–26 Photoshop Conference. San Francisco. Thunder Lizard Productions. Call: Marci Eversole, 1-800-221-3806.

January 25 Federal On-Site Technology Exhibit. Sacramento. US Army Corp of Engineers. Call: 1-800-878-2940.

January 25 & 26 Analysis And Design For Client/Server Applications Seminar. Santa Clara. DCI. Call: (508)470-3880.

January 26 South Bay Environmental Agenda Conference. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 27 Lecture By Richard Crum, Senior Editor For Berlitz Translation Services, On Preparing English Documents For Translation. Sunnyvale Society for Technical Communication, Silicon Valley Chapter. Call: (408)578-0796

January 28–February 4 Cyberfilm Festival. UC Theatre, Berkeley. Cyberfilm. Call: (510)644-9131.

January 29 Computer Show & Sale. San Francisco Cow Palace.

Continued

MONTEREY GAMING SYSTEM ANNOUNCES FREE INTERNET EMAIL ONLINE

Monterey

Access to the world's largest electronic mail network, the Internet, is now offered free of charge to all Monterey Gaming System members. For an online demonstration of Montery Gaming System's Internet email, dial (408)655-5555 at 8-N-1 with a modem or (408)655-5525 for customer support.

TUITION-FREE COMPUTER TRAINING FOR LAID-OFF WORKERS

San Jose

Mentor Training, a software instruction company, will allow people who have been laid off to take any class for just $25, the cost of the materials. Classes cover virtually every business program for Macintosh, DOS, and Windows-based systems. To apply, bring your Continued Claim Form (DE 4581-CTOS/S/) to the company's facility in San Jose. Mentor Training, 2880 Zanker Rd., Ste. 205, San Jose, CA 95134.

JANUARY 8

FUND-RAISER TO BENEFIT FRAMELINE

San Francisco

Digital Queers has organized a benefit in the Forum at the Center for the Arts on the final night of Macworld Expo. Proceeds will be used to acquire hardware and software for Frameline, an organization dedicated to encouraging film and video about gay, lesbian, and bisexual people. Call: (415)974-9122. Email: dq@yes.com (Internet) or DIGIQUEERS (America Online).

JANUARY 20

GOVERNMENT ONLINE ASSOCIATION PLANNING MEETING

Fremont

The Government Online Association gathers and electronically posts public information from Bay Area regional governments. It also provides an electronic forum for the discussion of local government issues and email boxes where constituents can leave their elected official a piece of their mind. The participation of city council members, county supervisors, city managers, and community association directors is requested in the planning meeting. Call: (510)795-4286 ext. 9.

JANUARY 28–FEBRUARY 4

CYBERFILM FESTIVAL

UC Theatre, Berkeley

Cyber arts, the future, and humanity and technology make up the theme of this unique event. Screenings of Hollywood and international classics include *2001: A Space Odyssey*, *A Clockwork Orange*, and *Blade Runner*. Independent discoveries *Wax* and *Tetsuo* premiere. Call: (510)644-9131 or (510)843-0847.

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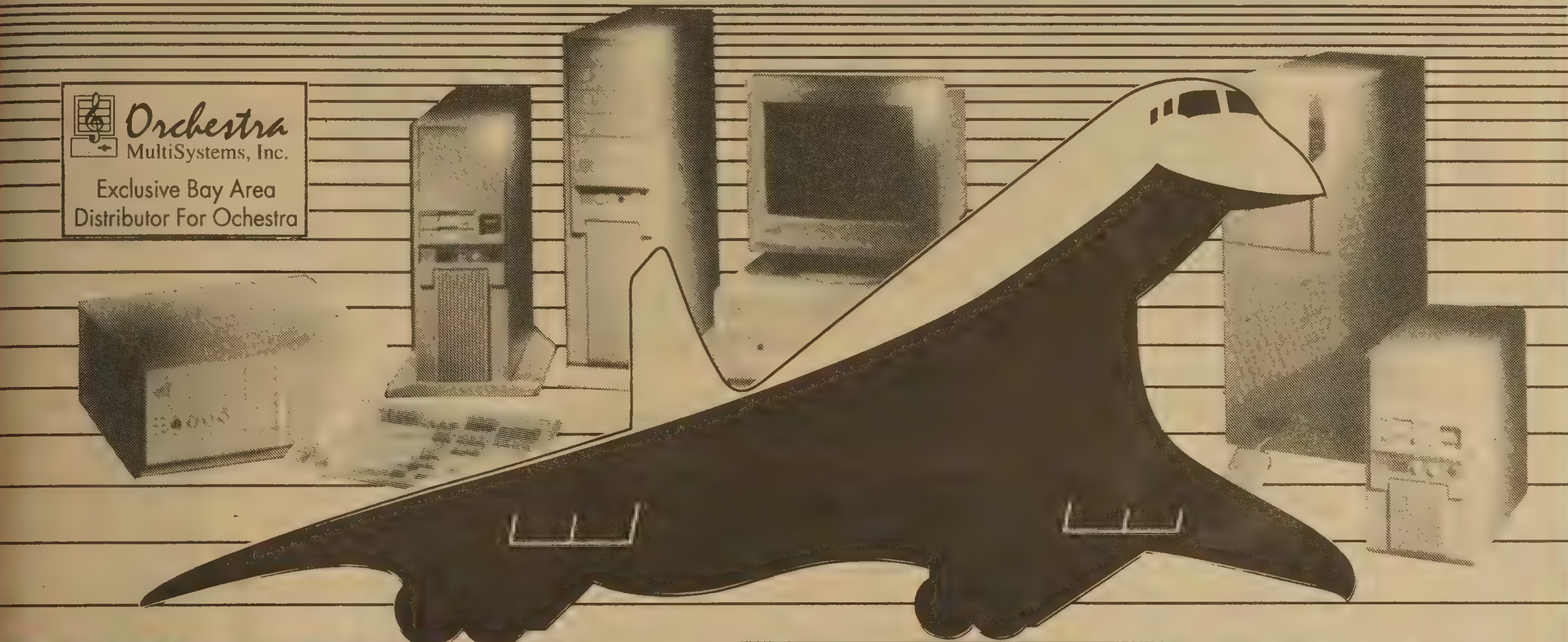

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486DX-33	$1898	$2485	$3455
486DX2-50	$2045	$2598	$3595
486DX2-66	$2098	$2681	$3655

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Everview 14' .28 SVGA	299
Orchestra 14" .28 Non-Int. SVGA	249
Edison 14" .28 Non-Int. Low Radiation	269
DIDo 15" .28 w/Microprocessor	369
DIDo 15" .28 w/Digital	389
MAG 15" .28 Non-Int. SVGA	469
MAG 17" .28 Non-Int. SVGA	909
NEC 15" 4FGE .28 Non-Int. SVGA	689
NEC 17" 5FGP .28 Non-Int. SVGA	1395
Viewsonic 14" 6E .28 Non-Int. SVGA	289
Viewsonic 15" .28 Non-Int. SVGA	469
Viewsonic 17" .28 Non-Int. SVGA	999
Nanoa 17" 550I	969
Nanoa 17" 550Iw	1169

DRIVES

1.2 & 1.44MB Floppy Drives	$49/40
120MB IDE Drive (2 Years Warranty)	149
210MB IDE Drive	209
245MB IDE Drive	239
270MB IDE Drive	259
340MB IDE Drive	289
420MB IDE Drive	350
520MB IDE Drive	509
1.2GB IDE Drive	889
120MB Colorado Tape Drive	129
250MB Colorado Tape Drive	179

MAINBOARD W/CPU

386DX-40 w/128K ISA	$120
486DX-33 w/256K VLB	379
486DX2-66 w/256K VLB	579
486DLC-40 w/128K VLB	200
486SLC-50 w/64K VLB	239
486SLC-66 ISA	239
486SLC-66 w/64K VLB	299

MISCELLANEOUS

IDE 2HD/2FD	$15
IDE 2HD/2FD w/2S/1P/1G	20
4FD for XT/AT	20
IDE Cache Controller	120
VLB IDE w I/O	40
AT I/O w/16550 Chip	45
SCSI Controller	65
Logitech Mouseman Bus	75
Logitech Trackman	75
Trackball	25
MicroSoft Curve Mouse	50
Logitech Mouseman	40
Laser Printer Memory Upgrades	*CALL*

MODEMS

Internal 96/24 Fax/Modem	$45
Internal 14.4/14.4 Fax/Modem	120

VIDEO

Trident 1MB SVGA ISA	$65
Trident 1MB SVGA VLB	80
Cirrus Logic IMB VLB	90
Orchid Celsius 1MB VRAM	230
Diamond Stealth Pro 1MB/2MB VRAM VLB	255/330
Diamond Viper VLB 2MB	370

SOUND CARDS

Gallant Sound Card SC-5000	$120
Sound Galaxy NX Pro	120
Sound Blaster Pro 16 MCD	175
Sigma WinSound 16 SCSI	125
Pro Spectrum 16	145
Sound Galaxy NX Pro 16	145

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  - Two Stereo Speakers
  - Bundle Software
- Eagle Joystick
- 6 CD Titles

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Mitsumi Double Speed CD-ROM	199
Panasonic CD562 CD-ROM	200
Toshiba 3401 CD-ROM	350

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1. One year parts and labor warranty on systems.
2. Knowledgeable technical support engineers in service.
3. Prices and availability subject to change w/o notice.
4. Shipping, Insurance and COD charges are extra and non-refundable. Prices reflect cash discounts.
5. Defective items replaced or repaired at our discretion.
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2015 Bridgeway
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FAX 415-332-5743

Calendar Of Events continued

Richard James. Call: 1-800-685-1400.

January 30 The Computer Show And Sale. Conference Center, South San Francisco. MarketPro. Call: (415)388-8893.

FEBRUARY

February 6 Computer, Ham Radio, Electronics Swap Meet. Livermore. Livermore Amateur Radio Club. Call: (510)447-3857 or (510)783-8052.

February 8–10 HP/Apollo Workstation Expo '94. San Jose. PCI. Call: 1-800-727-EXPO(3976)or email at workexpo@pcinews.lonestar.org.

February 18–20 The Computer Authority Show. San Francisco. Super Store Expo. Call: (516)499-0646.

February 19 & 20 Computer Show & Sale. Oakland Coliseum. Richard James. Call: 1-800-685-1400.

February 23–25 WinHEC: The Future Of Windows Hardware. San Jose. Microsoft Corp. Call: 1-800-421-6338.

February 26 Computer Show & Sale. Santa Clara County Fairgrounds. Richard James. Call: 1-800-685-1400.

February 27 Computer Show & Sale. Cal Expo, Sacramento. Richard James. Call: 1-800-685-1400.

February 27–March 3 Case World And Objex Conference And Exposition. Santa Clara. DCI. Call: (508)470-3880.

February 28 Software World USA: The Advanced Development Conference And Expo. San Francisco. DCI. Call: (508)470-3880.

MARCH

March 1–3 1994 Intermedia Conference. San Jose. Stamford Division. Call: (203)352-8445.

March 6 Computer, Ham Radio, Electronics Swap Meet. Livermore. Livermore Amateur Radio Club. Call: (510)447-3857 or (510)783-8052.

March 7–9 Business Issues Surrounding Portable Systems For Computing And Communications Conference. San Jose. Technologic Partners. Call: (212)696-9330.

March 9 & 10 Portable Systems For Computing And Communications Trade Show. San Jose. Technologic Partners. Call: (212)696-9330.

March 14–18 Business Software Solutions Conference And Exhibition. San Jose. Business Software Solutions. Contact: Business Software Solutions Conference & Expo, 600 Harrison St., San Francisco, CA 94107-9602.

March 16–19 Technology And Persons With Disabilities Conference. Los Angeles. CSU, Northridge Center on Disabilities. Call: (818)885-4929.

March 21 & 22 USENIX/SAGE Security & System Administration Management Seminars. San Francisco. USENIX. Call: (510)528-8649.

March 21–25 UniForum '94. San Francisco. World Expo Corp. Call: 1-800-225-4698.

March 30 & 31 Technology Update: Client/Server, Downsizing CASE And Database Seminar. Santa Clara. DCI. Call: (508)470-3880.

March 30–April 1 International QuickTime And Multimedia Conference. San Francisco. Sumeria. Call: (415)904-0811.

CLASSES, SEMINARS, AND WORKSHOPS

JANUARY

January 3 Intro To Microsoft Word Class. San Jose. InfoMind. Call: (408)243-1121.

January 3 & 10 Lotus 1-2-3 For DOS Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 3 & 10 QuarkXPress 3.1 Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 3 & 10 WordPerfect For DOS Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 3–24 Photoshop 3 & 4 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 3–24 Photoshop 1 & 2 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 4 Build And Upgrade An IBM PC Clone Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 4 Intro To Excel Class. San Jose. InfoMind. Call: (408)243-1121.

January 4–11 Director 1 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 4 & 11 Adobe Photoshop Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 4 & 11 Aldus Persuasion Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 4 & 11 Claris FileMaker Pro Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 4 & 11 Microsoft PowerPoint Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 4 & 11 Paradox For Windows Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 5 Intro To AmiPro Class. San Jose. InfoMind. Call: (408)243-1121.

January 5 Intro To WordPerfect Class. San Jose. InfoMind. Call: (408)243-1121.

January 5 & 6 Intro To DOS Class. San Jose. Mentor Training. Call: (408)433-0990.

January 5–12 Macintosh Basics Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 5 & 12 Microsoft Excel Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 5 & 12 Microsoft Word Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 6 IBM DOS Basics Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 6 Intro To Microsoft Windows 3.1 Class. San Jose. InfoMind. Call: (408)243-1121.

January 6 Intro To Quattro Pro For Windows 1.0 Class. Santa Clara. The Dublin Group. Call: 1-800-464-8344.

January 6 NetWare To DEC Connectivity Seminar. Sacramento. Novell. Call: 1-800-892-2922.

January 6–20 Adobe Illustrator Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 6 & 7 Intro To Networks Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 6 & 13 Corel Draw Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 6 & 13 Paradox For DOS Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 6 & 20 Free Automating Your Business Accounting System Seminar. San Francisco. J.C. Lukrich & Co. Call: (415)905-6900.

January 6 & 20 Free Seminar On What Lead Tracking And Contact Management Software Can Do For Your Business. San Francisco. J.C. Lukrich & Co. Call: (415)905-6900.

January 7 Customized Software Class. San Jose. InfoMind. Call: (408)243-1121.

January 7 Free Office Automation And Databases For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 7 Introduction To Lotus 1-2-3 Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 7 & 14 Adobe Photoshop Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 7 & 14 FrameMaker Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 7 & 14 Harvard Graphics Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

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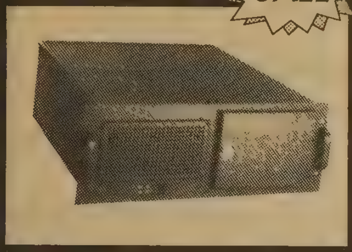

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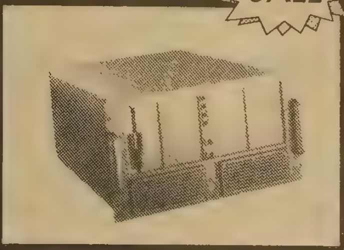

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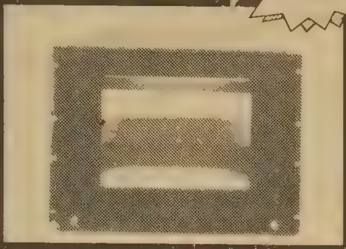

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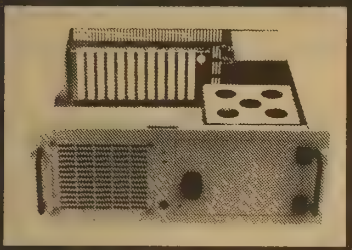

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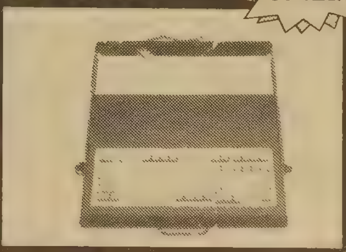
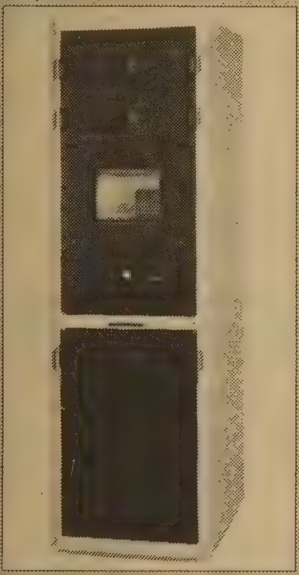
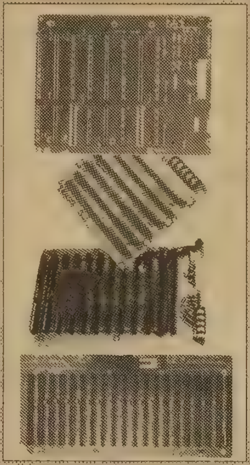


CENTRALIZED LAN SYSTEM



PASSIVE BACKPLANE BOARD



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8 SLOT $35

12 SLOT $90

14 SLOT $94

18 SLOT ...$180

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- 20 SLOT SEGMENTED 5,5,5,5

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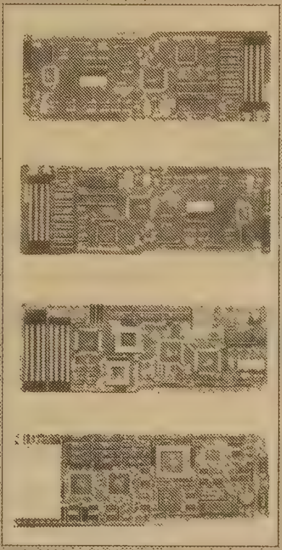

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386SX-16 CPU Card System	$430
386SX-20 CPU Card System	$440
386DX-33 CPU Card System	$515

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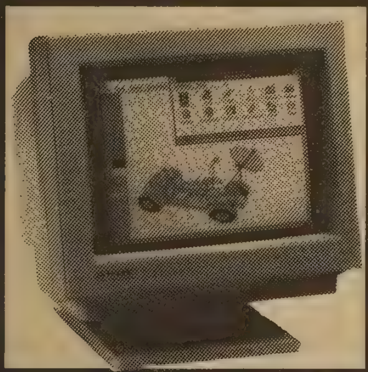
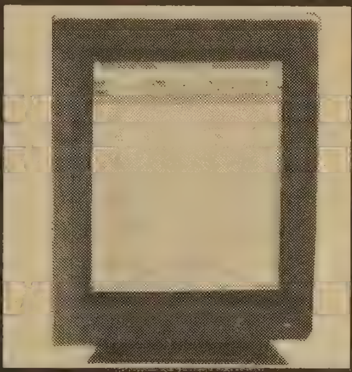
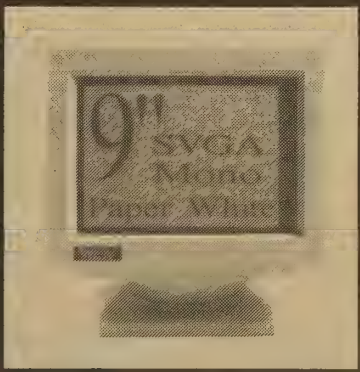


14" SVGA COLOR MONITOR
- CRT 14" DIAGONAL NON-GLARE FLAT
- DOT: .28mm
- RES. 1024 X 768 NON-INTERLACE 800 X 600, 720 X 400, 640 X 480, 640 X 350
- POWER SUPPLY: 120-240V AUTO SELECTION



15" MACINTOSH FULL PAGE MONITOR
- CRT: 15" DIAGONAL NON-GLARE FLAT PAPER WHITE
- MACINTOSH II, SE, SE/30 COMPATIBLE
- RES. 640x872 FULL PAGE
- POWER SUPPLY: 96 to 250V

15" PAPER WHITE VGA MONITOR
- CRT: 15" DIAGONAL NON-GLARE FLAT PAPER WHITE
- RES: 640 x 600, 640 x 556, 640 x 350, 720 x 400, 640 x 480
- POWER SUPPLY: 120V



9" SVGA MONITOR MONO PAPER WHITE
- CRT: 9" x 90 DEFLECTION NON-GLARE PAPER WHITE
- RES. 1024x768, 720x400, 640x480
- POWER SUPPLY: 100-240V

HYUNDAI

1. COLOR MONITORS

Model	DESCRIPTION	PRICE
HMC-421B	14" SUPER VGA .39 Dot Pitch	$248
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Calendar Of Events continued

January 7–21 Director 3 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 8 CNE Hands-On Study Group. Oakland. Excel Micro Solutions.Call: (510)836-2040.

January 8 Computer Show & Sale. Alameda County Fairgrounds. Richard James. Call: 1-800-685-1400.

January 8 Intro To Client/Server Architectures Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7372.

January 8 & 15 FrameMaker Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 9 FrameMaker Class. San Jose. InfoMind. Call: (408)243-1121.

January 9 PageMaker Class. San Jose. InfoMind. Call: (408)243-1121.

January 9 Publisher Class. San Jose. InfoMind. Call: (408)243-1121.

January 10 Adobe Illustrator I Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 10 Intermediate Microsoft Word Class. San Jose. InfoMind. Call: (408)243-1121.

January 10 Intro To Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 10 PageMaker I Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 10 & 11 Estimating, Scheduling, And Tracking Documentation Projects Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 10 & 12 Intro To Windows Class. Oakland. Heald Corporate Training Ctr. Call: 1-800-677-0277.

January 11 Free Powerbook Remote Office For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 11 Intermediate Excel Class. San Jose. InfoMind. Call: (408)243-1121.

January 11 Intermediate Lotus DOS Or Windows Class. San Jose. InfoMind. Call: (408)243-1121.

January 11 Intro To Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 11 Mac Basics Level II Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 11 & 13 WordPerfect 5.1 For DOS Class. Oakland. Heald Corporate Training Ctr. Call: 1-800-677-0277.

January 11 & 18 Job Of The Marketing Professional Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 12 Intermediate AmiPro Class. San Jose. InfoMind. Call: (408)243-1121.

January 12 Intermediate WordPerfect Class. San Jose. InfoMind. Call: (408)243-1121.

January 12–March 23 Intro To Data Communication. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 12 & 19 Intro To Microsoft Project 3.0 Class. Santa Clara. The Dublin Group. Call: 1-800-464-8344.

January 13 Claris FileMaker Pro I Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 13 Claris Filemaker Pro II Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 13 Free Windows 3.11 For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 13 Intro To Microsoft Word For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 13 Microsoft Word Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 13 & 14 Developing A Document Plan Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 13 & 14 PC Repair Two-Day Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 14 Customized Software Class. San Jose. InfoMind. Call: (408)243-1121.

January 14 Free Networks For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 14 Intro To WordPerfect Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 14–February 4 Elements Of Multimedia Design Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 14 & 15 Foundations Of Continuous Improvement And Quality Management. Santa Clara. UC Santa Cruz Extension. Call: (408)784-7383.

January 14 & 21 Overview Of Design For Desktop Publishing Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 15 Lotus For DOS Class. San Jose. InfoMind. Call: (408)243-1121.

January 15 Overview Of Graphics Production Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 15 Quattro Pro For Windows Class. San Jose. InfoMind. Call: (408)243-1121.

January 15–22 Intro To Networks Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 15–April 2 Computer Skills And Graphics Production Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 15 & 16 Overview Of Graphic Design Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 16 FileMaker Pro Class. San Jose. InfoMind. Call: (408)243-1121.

January 16 Lotus Approach Class. San Jose. InfoMind. Call: (408)243-1121.

January 16 Microsoft Access Class. San Jose. InfoMind. Call: (408)243-1121.

January 17 Adobe Illustrator II Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 17 Intro To Microsoft Word Class. San Jose. InfoMind. Call: (408)243-1121.

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January 18 Free Office Automation For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 18 Intro To DOS 6.0 Class. Santa Clara. The Dublin Group. Call: 1-800-464-8344.

January 18 System 7 Workshop. San Francisco. Media Alliance. Call: (415)771–7133.

January 18 & 20 Excel For Windows Class. Oakland. Heald Corporate Training Ctr. Call: 1-800-677-0277.

January 18 & 25 FrameMaker Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 18 & 25 Intro To Microsoft Project 3.0 Class. San Francisco. The Dublin Group. Call: 1-800-464-8344.

January 19 Intermediate WordPerfect For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 19 Microsoft Excel I Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 19–26 Painter Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 19 & 26 Lotus 1-2-3 For Windows Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

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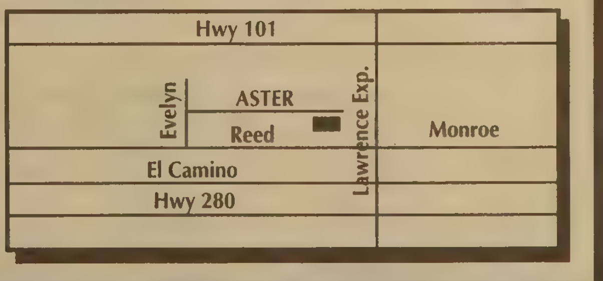

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January 19–March 18 Design For General Printing And Desktop Publishing Class. Oakland. Laney College. Call: (510)464-3263.

January 19–March 18 Electronic Publishing Class. Oakland. Laney College. Call: (510)464-3263.

January 19–March 18 Traditional And Electronic Pasteup Class. Oakland. Laney College. Call: (510)464-3263.

January 20 Intro To Microsoft Windows 3.1 Class. San Jose. InfoMind. Call: (408)243-1121.

January 20 Intro To Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 20 Intro To WordPerfect 6.0 DOS Class. Santa Clara. The Dublin Group. Call: 1-800-464-8344.

January 20 Microsoft Word II Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 20 QuarkXPress I Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 21 Build And Upgrade An IBM PC Clone Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 21 Free Internet For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 21 & 22 Photoshop Basics Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 21 & 27 Microsoft PowerPoint Level 2 Class San Jose. Mentor Training. Call: (408)433-0990.

January 21 & 28 QuarkXPress 3.1 Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

January 22 Intermediate WordPerfect Class. San Jose. InfoMind. Call: (408)243-1121.

January 22–March 26 Multimedia Production Tools Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 23 CorelDraw On PC Class. San Jose. InfoMind. Call: (408)243-1121.

January 23 Freelance Graphics On PC Class. San Jose. InfoMind. Call: (408)243-1121.

January 23 Persuasion On Mac Class. San Jose. InfoMind. Call: (408)243-1121.

January 23 PowerPoint Class. San Jose. InfoMind. Call: (408)243-1121.

January 24 Intro To Object Pal Class. San Francisco. The Dublin Group. Call: 1-800-464-8344.

January 24–March 28 Principles Of Graphic Design Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 24 & 25 PC Repair Two-Day Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 24 & 26 WordPerfect 6.0 For DOS Class. Oakland. Heald Corporate Training Ctr. Call: 1-800-677-0277.

January 25 Free Multimedia For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 25 Intermediate Excel Class. San Jose. InfoMind. Call: (408)243-1121.

January 25 Intermediate Lotus 1-2-3 Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 25 Mac Maintenance And Troubleshooting Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 25–April 19 Foundation Of Graphics Production Class. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

January 25 & 27 Word For Windows Class. Oakland. Heald Corporate Training Ctr. Call: 1-800-677-0277.

January 26 Intermediate Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 26 Intermediate WordPerfect Class. San Jose. InfoMind. Call: (408)243-1121.

January 26 Microsoft Excel II Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 26 & 27 Intro To PageMaker 5.0 Class. San Francisco. The Dublin Group. Call: 1-800-464-8344.

January 27 QuarkXPress II Class. San Francisco. Media Alliance. Call: (415)771-7133.

January 27–February 10 QuarkXPress Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 27–February 17 Computer Media Fundamentals Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 27–28 Intro To Networks Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

January 28 Free Increasing Productivity For Legal Professionals Seminar. San Francisco. Network Services Group. Call: (415)863-8407.

January 28 Intermediate Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 28 Quicken For DOS Or Windows/Quickbooks Class. San Jose. InfoMind. Call: (408)243-1121.

January 28 & 29 Team Dynamics And Decision Making. Santa Clara. UC Santa Cruz Extension. Call: (408)784-7383.

January 28–February 4 Premier & Sound Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 29–February 19 Multimedia Design And Integration Class. San Francisco. Zakros Interarts. Call: (415)282-5497.

January 30 Microsoft Works Class. San Jose. InfoMind. Call: (408)243-1121.

January 31 Advanced WordPerfect Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 31 Intermediate Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

January 31 Intro To Microsoft Word Class. San Jose. InfoMind. Call: (408)243-1121.

January 31 Intro To PC Or Mac Class. San Jose. InfoMind. Call: (408)243-1121.

January 31–February 21 Photoshop 1 & 2 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 31–February 21 Photoshop 3 & 4 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

January 31 & February 7 Adobe Illustrator Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

FEBRUARY

Febraury 1 Quattro Pro For Windows Class. San Jose. InfoMind. Call: (408)243-1121.

February 1–15 MacroModel Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 1 & 8 Adobe Illustrator Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 1 & 8 Aldus Persuasion Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 1 & 8 FileMaker Pro Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

continued on page 308

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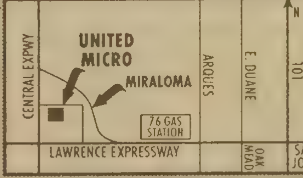

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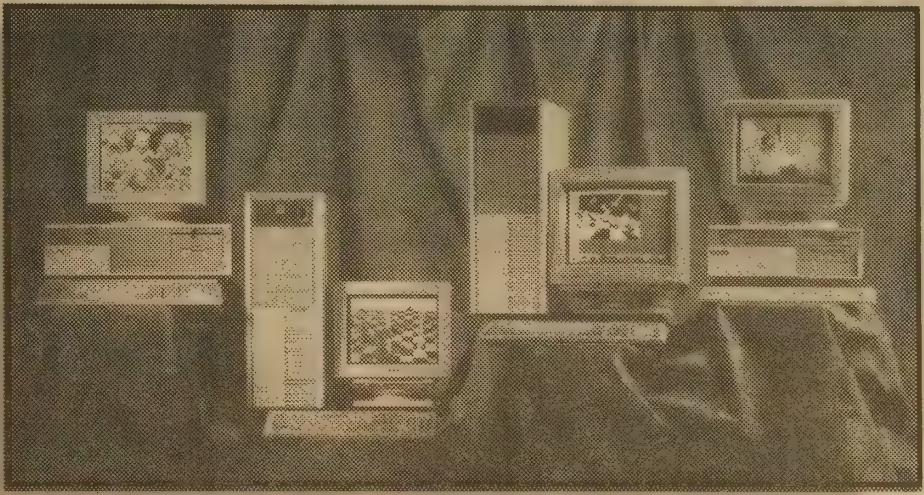

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408

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The Meating Place BBS. (408)926-6174. 24 hrs., 14,400. Gay/Bi, six lines, email, chat, matchmaker, GIFs, and more. System password: Micro. Sysop: John C. Lambert. [Exp. #120.]

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The Mud Hole BBS. (408)865-1647. 2400/9600/14,400. Two lines, many door games, files, GIFs, and FidoNet. [Exp. #118.]

Nitelog BBS. (408)655-1096. 24• hrs., 300–16,800. DOS/Windows/OS2 adult files, 24 lines, 6.3GB. Sysop: Karl Van Lear. [Exp. #120.]

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415

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Anatomically Correct BBS.

Continued

BAY AREA BBSes

By Kathleen Creighton

Finding Missing Children Online:

Hype And Hope

The purpose of this column is to set the record straight regarding the relationship between missing child searches and online technology.

In the end, the solution to the abduction of Sonoma County resident Polly Klaas was provided by another Sonoma County resident, 30 miles from Polly's home, and a Sonoma County deputy sheriff. According to the National Center for Missing and Exploited Children, a large percentage of stranger abduction cases are resolved within 50 miles of the location at which they occurred.

During the search phase of the Klaas case, Bay Area media played up the fact that the ubiquitous posters of Polly went out around the world on a "computer network," furthering the myth that anything propagated by computer is somehow more powerful than television or more efficient than those things propagated manually—in this case, posters folded and stuffed into envelopes and sent around the US via US mail.

As I've found lately from researching this issue and observing discussions among adults regarding stranger abductions, people tend to believe that there are more tools, more networks, more law enforcement coordination, than actually exist. No one knows exactly what to believe, and it's very possible—even likely—that the average person who hears that information about missing children will soon be available via the "information highway" will believe that because computers are involved, the search for missing children is somehow easier.

Finding children is still dependent on thorough law enforcement investigation and leads generated by people who "know something," even if they don't know that they "know" it.

WHAT HAPPENS WHEN A CHILD IS MISSING

Let me explain how the "system" works if your child is abducted. I'll limit this to stranger abductions, as abductions by family members, usually over custody disputes, are more complex.

First you notify your local law enforcement agency. The agency investigates to determine the likelihood that your child is missing as the result of a stranger abduction and hasn't just wandered away or, in the case of an older child, run away. Without evidence to the contrary, law enforcement agencies are now quicker to work with the theory that they are, in fact, dealing with a stranger abduction, especially in the case of children under thirteen, though in the Bay Area, law enforcement agencies will also grant that status more quickly to older children. Not all law enforcement agencies nationwide will, and there is no national policy to compel them to do so.

Law enforcement agencies are required to report the crime to the National Crime Information Center. Not all do. (This is why statistics regarding kidnappings are not hard and fast—reporting is more uniform than it used to be, but it is not 100%.) This reporting, in turn, does not stimulate any kind of special response independent of requests for assistance that might be made by your local law enforcement agency.

NCMEC

After you have contacted your local law enforcement agency, the single most important phone call you can make is to the National Center for Missing and Exploited Children (800-843-5678). NCMEC then contacts your local law enforcement agency to verify that it has classified this disappearance as a stranger abduction.

Continued

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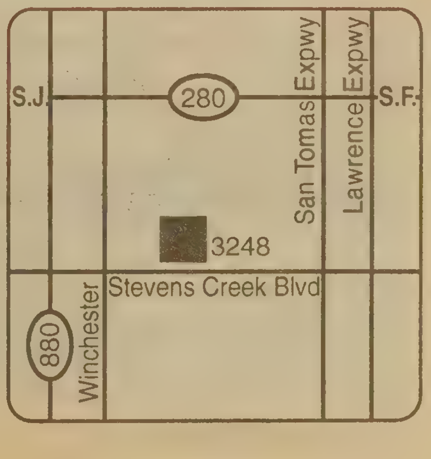

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Bay Window BBS. (415)755-2939. 9 am–11 pm, DOS, demal, windows, games, utilities files, no GIFs or handles allowed. Sysop: Judy. [Exp. #118.]

California Online! (415)331-4081. 14,400. 20 Lines, wide local calling area. Internet email, Usenet Newsgroups, real-time Internet gateway. Sysop: Jim Thornson. [Exp. #120.]

Clipboard. (415)239-0454. 12pm–12am. 14,400. Clipper files, FidoNet, Internet, Intelec newsgroups and conferences (job listings, for sale), and doors. Sysop: George Jereza. [Exp. #118.]

ComPUCall. (415)703-1297. 7-E-1, 1200/2400. California's Public Utilities Commission's calendars, decisions, releases. [Exp. #120.]

Corner UNIX. (415)564-8750, 564-4345. 8-N-1, 1200/2400/9600/14,400. San Francisco Public Access UNIX. Full USENET, Internet email, multiline. Sysop: Furyeel. [Exp. #118.]

Creekside BBS. (415)343-5692. 1200/2400/9600/14,400. Genealogy & history files and messaging. Intelec, Seeknet, Science Factor Net, GTpowerNet. [Exp. #120.]

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Fun University Network. (415)327-4591. 8 lines. Free graphical interface, hosted multi-player simulation games, current events focus. Sysops: Wendie, Mike, Lisa, and Scott. [Exp. #118.]

Hotline Computers BBS. (415)349-5136. 2400. Computer users' subjects, 1.2GB files, classifieds, shopping. Free. [Exp. #120.]

The House Of Solitude. (415)969-THOS. 24 hrs., 300/1200/2400/9600/14,400. Internet mail, files including OS/2, DOS, Windows, UNIX, and text. Sysop: Macron Factor. [Exp. #118.]

HTG/Outreach BBS. (415)572-9594. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. Gay/lesbian/bisexual/transgender, community system. Six lines. Chat, files, FidoNet, GayNet, PODnet. Free access on two lines. Sysop: Sagittarius. [Exp. #120.]

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The New Dork Sublime. (415)864-DORK, 255-NERD. 300/1200/2400/9600/14,400. NIRVANAnet—as seen in the National Enquirer. Sysop & Supreme Dork: Joseph Griego. [Exp. #118.]

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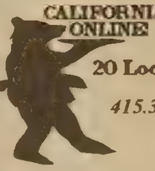

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BBS Column continued...

NCMEC also verifies all information pertinent to the case. It is NCMEC which notifies all other law enforcement agencies through its forty-three-state clearinghouses. In the last year, NCMEC has been working on distributing that information to its clearinghouses via CompuServe. NCMEC administers the only national notification of law enforcement agencies (seventeen thousand agencies), but you must go to NCMEC to start the process. Your law enforcement agency does not do it; the FBI does not do it. NCMEC will not seek your case out.

NCMEC also has a relationship with the Fox network, home of *America's Most Wanted* and public service spots called "Missing Child." If NCMEC is notified right away, it can work quickly, moving photos around to its clearinghouses and photos and home videotape to Fox network via satellite from the local TV station. NCMEC considers television its most important and immediate tool, but certainly not the only one.

ONLINE LEAD GENERATION

Computer columnist Larry Magid brought representatives of all of the commercial online services together with the NCMEC so that each service will, in some way, have missing child photos and NCMEC information available online. CompuServe has had such a graphics file area for almost seven years in conjunction with the National Child Safety Council, and in January will offer a "missing child" forum as well, at no charge to CompuServe subscribers.

The online services have not yet worked out complete details regarding how each will handle the information—which, by the way, will be available only to that service's subscribers, but more about that later.

Magid got Internet provider Netcom interested in making NCMEC information available via the Internet. NCMEC plans to make all of the missing child information available regardless of the circumstances of abduction or "at risk" runaway.

Apparently no one knew that a Usenet newsgroup, alt.missing-kids, and a file site (halcyon.com) had been in business for eighteen months through the cooperation of Heidi Search Center in San Antonio and Northwest Nexus, Inc., halcyon's parent company; due to liability issues, they handle only stranger abduction information from the NCMEC. Ralph Sims, halcyon's system administrator, says that they will go through the steps to get a "misc.missing-kids" newsgroup approved after the first of the year, since not all Usenet sites take the "alt.*" hierarchy of newsgroups.

BBS sysops without accounts on the commercial services and without Internet accounts can get the same information from Heidi Search Center (Marv Cotton) via the Fidonet echo message area MISSING_CHILD.

NCMEC's president, Ernie Allen, sees the connection to online services as another tool wherein almost five million sets of "eyes" are potentially available to help generate leads (over twenty million sets of "eyes" if the population of the Internet is factored in.) But "potentially available" is the point to remember, contrary to media reports implying that a computer network or online service is somehow going to actively put missing child information in the face of its subscribers by virtue of their simply having logged in.

NCMEC is more interested in having the subscriber look at the photo than it is in making sure there's a poster in every 7-11 because NCMEC is most interested in generating leads. But the fact remains that having missing child information online is a passive system, and is only as useful as the number of users who access it.

For its part, NCMEC will be making all of its child-safety material available online as a service to the online community, a feature that will likely be very popular.

To put this in perspective, twenty-one million sets of eyes is less than half of those exposed to ADVO cards (fifty-four million). But if the ADVO audience and the online audience are not the same, NCMEC has the potential to reach seventy-five million people, to find those few people who might "know something." Every little bit helps to bring kids home. ■

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Recovery BBS. (415)255-2188. 8-N-1, 300/1200/2400. Dedicated to 12-step recovery programs. AA, NA, Al-Anon/ACA, SLAA. Recovery and 12-step Echos. Fido 125/9. Sysop: Rich Gorlin. [Exp. #120.]

The Road Not Taken. (415)648-8462. General conversation, discussion of current issues, miscellaneous blather. Free. Sysop: Bryan Magers. [Exp. #120.]

Robotic BBS. (415)648-6427. 8-N-1, 24 hrs. Software and messages for robot building enthusiasts. Sysop: Brad Smallridge. [Exp. #118.]

Salt And Light BBS. (415)368-0790,,,252525. 8-N-1, 24 hrs., 2400. Bible/God questions answered by four ordained ministers. Bible study helps and more. Free. Sysop: Lorin Wilson. [Exp. #118.]

The Stealth BBS. (415)344-3524. 8-N-1, 24 hrs., 2400/9600/14,400/16,800/38,400. Specializing in VGA GIFs, Sound Blaster, Star Trek. 400MB. Free. [Exp. #118.]

Tsoft BBS And Public Access Unix. (415)969-7958. 8-N-1, 10 lines. Unix accounts on the Internet. info@tsoft.net. Free. [Exp. #118.]

Uncle D's Directory. (415)364-3001. 8-N-1, 24 hrs., 1200/2400/9600. Hearing-impaired and educational purposes, game doorways, RimeNet, and more. No fees. [Exp. #120.]

/usr/school/BBS. (415)564-8896. 7-E-1, 24 hrs., 1200/2400. How to access the Internet, C & UNIX classes. If garbage; press space. Sysop: Dennis McMamara. [Exp. #120.]

VidGame BBS. (415)742-6457. 2400/9600/14,400/16,800. Games 7000+ steamy adult Gifs, online games, 3.5+ Gigs space, 1000's of utilities. Sysop: George Hassmer. [Exp. #121.]

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Wetware Diversions Public UNIX. (415)826-0397. 8-N-1, 24 hrs., 1200/2400. Eight lines, full UseNet news. Sysop: Eric Swason (editor@wet.UUCP). [Exp. #120.]

Window World BBS. (415)931-0649. 24 hrs. For people who use Windows-type software; info, shareware, chat. Sysop: Bob Cram. [Exp. #120.]

510

8-Bit Apple User Group. (510)294-8052. 24 hrs., 300/1200/2400. Apple II support, email, messages, games, files. Free. Sysop: Noel Anklam. [Exp. #118.]

Activist. (510)532-6248. Lots of conspiracy text files—CIA, KGB, FBI, JFK, RFK, MLK, NSA, ADL, CFR, etc. Sysop: Walter Alter. [Exp. #120.]

Amiga Addicts Anonymous BBS. (510)680-2850. 8-N-1, 24 hrs., 1200/2400/9600/14,400. Amiga files. Free. Sysop: Stanley R. [Exp. #118.]

BayB—The Bay Area Baby Board. (510)528-8164. 8-N-1, 14,400. Parents' support network: games, education, health, reviews. Free. Sysops: Lori and Derek. [Exp. #120.]

Bay View Graphics BBS. (510)799-6456. Graphics and multimedia files for OS/2, DOS, and Windows. BRRAnet, echo mail. Sysop: Bob Rider. [Exp. #120.]

Berkeley WWIV Chess BBS. (510)486-0795. 8-N-1, 2400. Chessmaster's corner, Fido International Chess Echo, USENET games, chess. Free. Sysop: Walter Wood. [Exp. #118.]

Bust Out BBS. (510)881-1443. 24 hrs., 14,400. Nine nodes, 7GB, huge msg and file network (many adult). Computer systems and software services. Sysop: Alex J. Riggs. [Exp. #120.]

California High-Flyers BBS. (510)568-9250. 8-N-1, 24 hrs., 300/1200/2400. More Bay Area numbers, nine lines, chat, email, library. Ages 10 and up. Two subscription levels. Sysop: Carl Dominic. [Exp. #118.]

Camphor Fountain BBS. (510)547-5741. 8-N-1. Baha'i Network, creative, professional writing, recovery, home schooling, parenting, world religions. Free. Sysop: Linda Martin. [Exp. #118.]

Caxius BBS. (510)895-6961. 24 hrs., 300/1200/2400/9600/14,400. Over 5,000 files and more. Now supporting FidoNet. We want active users. Free. Sysop: Ed Correia. [Exp. #120.]

Dear Theophilus BBS. (510)831-THEO. 8-N-1, 300/1200/2400/9600/14,400. Games, 8000 Mac files, discussion, God talk. Free. Sysop: Mark Spaulding. [Exp. #118.]

The Diamond Mind. (510)791-1910. 8-N-1, 24 hrs., 300/1200/2400/9600/14,400. Emotional support, IBM and Mac files, Fido echos, chat, online games, adult areas. Free user level. Sysop: Diamond & Frank. [Exp. #118.]

El Cerrito PD Public Safety BBS. (510)235-3273. 24 hrs., 14,400. Crime prevention and law enforcement oriented, with access to WCLawNET. [Exp. #118.]

Express BBS. (510)317-9685. 24 hrs., 300/1200/2400. Early childhood education forum, DOS and Windows shareware. Free. Sysop: Michael Deyerle. [Exp. #118.]

Friendliest BBS. (510)432-7802. 24 hrs., 300/1200/2400/9600. Software exchange. $5 yearly fee. Sysop: Doyle Goodman. [Exp. #118.]

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GIFt Shop. (510)689-4686. Eight lines, 9+ Gigs. The world's best scans originate here. Sysop: Waik Gan. [Exp. #118.]

Gizmonic BBS. (510)889-9341. 8-N-1, 300/1200/2400/9600/14,400. New and growing message base. Flexible. A place to call home. Free. Sysop: Tom Servo. [Exp. #120.]

Gold Diggers BBS. (510)568-7807,,,23,23 (must include ,,,23,23 to get BBS). 24 hrs., 2400/9600/14,400/ 19,200. IBM, Atari ST, Amiga, Mac, files and messages. Registration $10 per year. [Exp. #120.]

The Hobby Shop BBS. (510)357-4125. 8-N-1, 2400/38,400. Fun place to meet others. Over 8 Gigs and growing. Free first call. [Exp. #120.]

Initiative BBS. (510)654-2253. 8-N-1, 300/1200/2400. A political board featuring documents and discussion on the left in the US and the future of socialism worldwide. Sysop: Steve Willett. [Exp. #120.]

Legal Information Systems. (510)644-1899. 24 hrs., 1200/2400. California Appeals, California Supreme Court, and US 9th Circuit recent decisions. Full text search. [Exp. #118.]

The Lost Worlds BBS. (510)888-1714. 8-N-1, 2,000-plus files, messages, and online games. We have it all. Call now! [Exp. #118.]

Morph's Outpost On The Digital Frontier. (510)238-4554. 14,400. First-class BBS. [Exp. #118.]

Motorcycle Happenings BBS. (510)676-7872 1200/2400/ 9600/14,400. If you own a motorcycle and like to ride, this is the place. Rides, events, clubs—it's all here. Sysop: Mark Cowan. [Exp. #120.]

The New-Ark BBS. (510)796-0947. 24 hrs., 300/1200/2400/9600. Tradewars, running on two CD-ROMs. Reg. required. Sysop: Hiram Wolf. [Exp. #120.]

Otoko Empire BBS. (510)754-6521. 24 hrs., 1200/2400. Specializing in gay topics, travel, international pen pals, male GIFs. Sysop: Hiroshi. [Exp. #121.]

The Party Wherehouse BBS. (510)256-9809. 8-N-1, 24 hrs., 14,400. 3.9 Gigs, 25 CDs, live chat, InterNet, UUCP. Adult, gay, lesbian, bi users welcome. [Exp. #120.]

Rapture BBS. (510)689-6955. 8-N-1, up to 14,400. Erotic images, shopping mall, Internet gateway. Adults only. Sysops: Athina and Aphrodite. [Exp. #118.]

Realitycheck. (510)527-1662. 9600. Now in Albany, instant access. NIR-

ASSOCIATIONS

American Association For Artifical Intelligence. Meetings: Individuals interested in learning about the use and application of AI. Call: Richard Skalsky, (415)328-3123, fax: (415)321-4457, email: membership@aaai.org. [Exp. #119.]

The Association For Customer Support Professionals (ACSP). Meetings: Quarterly. Dedicated to the deveopment and furtherance of customer support as a distinct profession, to the growth of the support community, and to the improvement of support service. Call: (510)865-4515. Email: tao@well.sf.ca.us or 71333,2116@Compuserve.com. [Exp. #123.]

Association Of Information Systems Professionals (AISP). Write: 922 Weddell Ct., Sunnyvale, CA 94090. Forums, support, network for IS Professionals. Many SIGs. Call: Al Normantas, (408)745-7600. Fax: (408)745-0740. [Exp. #118.]

Black Data Processing Association, Silicon Valley Chapter. Meetings: 4th Thursday, 6:30 pm, Amdahl Corp., Bldg. H, 1240 E. Arques Ave., Sunnyvale. National network of DP professionals, educators, students, and vendor reps. Call: Willie Mackey, (408)280-7624. [Exp. #122.]

Computer Professionals For Social Responsibility. Meetings: Last Sun., 2:00 pm, BMUG Offices, 2066 Center St., Berkeley. Call: Judy Stern, (510)643-7499. [Exp. #118.]

Computer Software Industry Association. CSIA monitors all state legislation which affects the computer software industry and some federal issues. Call: (415)948-9192. [Exp. #118.]

IEEE Computer Society, San Francisco Chapter. Meetings: alternating Weds., 7:30 pm, SF State. Call: (415)905-4400. [Exp. #118.]

Independent Computer Consultants Association, Northern California Chapter. Meetings: 7:30 am–9:15 am, Parc Fifty-Five Hotel, San Francisco. Open discussion, questions and answers. Call: (415)978-9416. [Exp. #120.]

Independent Computer Consultants Association, Silicon Valley Chapter. Meetings: 4th Thrus., 6:00 pm. Hobee's Resturant, 920 Town & Country Village, San Jose. Provides a network for independent computer professionals in South San Francisco Bay and Monterey Bay areas.. Call: Chapter Hotline, (408)492-8888. [Exp. #118.]

National Association Of Professional Organizers (NAPO). Meetings: 2nd Wed., 6:30 pm, Westin San Francisco Airport Hotel in Milbrae. The cost for guests who pre-register is $12; at the door, $15. Call: (415)461-3537. [Exp. #119.]

North Bay Systems Professionals. Meetings: 3rd Wed., 6:00 pm networking, 7:00 pm dinner, 8:00 pm speaker. Embassy Suites Hotel and Conference Center, 101 McInnis Parkway. NBSP provides a forum for systems professionals to grow and to benefit from a network of other like professionals. Call: (415)721-4409. [Exp. #120.]

San Francisco Computer Society. Meetings: 4th Mon., 7:00 pm, Presbyterian Church, 1329 7th Ave., San Francisco. Call: Bob Forsberg, (415)885-6206. [Exp. #120.]

San Francisco Robotics Society Of America. Meetings: 1st Wed., 8:00 pm, Exploratorium, San Francisco. Free. Call: Brad Smallridge, (415)550-0588. [Exp. #120.]

Society For Technical Communication, Berkeley Chapter. Meetings: 2nd Wed., 6:30 pm dinner, 7:45 pm program, Upstairs at Yenching Restaurant, 2017 Shattuck Ave., Berkeley. Different speaker every month. Call: (510)466-5464. [Exp #119.]

Society For Technical Communication, East Bay Chapter. Meetings: 1st Thursday. Red Lobster in Dublin. A nonprofit organization for writers, editors, managers, educators, students, and graphic artists. Call: (510)831-1098. [Exp. #122.]

Society For Technical Communication, San Francisco Chapter. Meetings: 3rd Wed., 6:00, program at 7:00 pm. Stagecoach Resturant, 44 Montgomery St., San Francisco. For technical writers, editors, and other technical communicators. Some meetings are dinner meetings, for which reservatins are necessary. Call: (415)985-7121. [Exp. #120.]

Society For Technical Communication, Silicon Valley Chapter. Meetings: 4th Thurs. 5:30 pm cocktails, 6:30 pm dinner, 7:15 dessert. Sunnyvale Hilton, 1250 Lakeside Drive (off Lawrence Expressway at 101). Guest speakers, special interest groups, networking, job listings, newsletter. Call: (408)578-0796. [Exp. #120.]

Software Entrepreneurs' Forum. 3rd Wed., 6:30 pm, Elk's Lodge, 4249 El Camono, Palo Alto. Industry association dedicated to software developers and entrepreneurs, offering information and education on all facets of the software industry. Call: Information, (415)854-7219; reservations, (415)965-9003. [Exp. #120.]

United Sysops Association (U.S.A.). Meetings: 2nd Wed, 7:30 pm, call for location. Call: Beth Hall, (408)522-8690. [Exp. #123.]

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USER GROUPS

ADOBE

Systems Adobe Technology Exchange. Meetings: 3rd Thurs., 6:30 pm, Ultradata Corp., 5020 Franklin Dr., Pleasanton. Call: (510)417-4185. [Exp. #122.]

AMIGA

AUM—Amiga Users Of Marin. Meetings: 3rd Wed., 7:30 pm, College of Marin Science Center, Rm. 191, Kentfield. Desktop Video SIG, Rm. 192, 6:00 pm. Call: (415)479-6717. BBS: (415)485-5895. [Exp. #120.]

AWEST Amiga Users In SF. Meetings: 1st Thurs., 7:00 pm, Laguna Honda School, Conference Rm, 1350 7th Ave., San Francisco. Call: (415)584-8406; BBS: (415)824-8774. [Exp. #120.]

FAUG—First Amiga User Group. Meetings: 1st Tues., 7:30 pm, HT Electronics, 275 N. Matilda Ave., Sunnyvale. Q &A, new product demos, public domain software. Call: Mike Fisher, (415)855-9816; BBS: (415)341-7566; Usenet: mikef@vid.hp.com. [Exp. #122.]

Original Amiga User Group. Meetings: 2nd Wednesday Winner Circle Systems, 2618 Telegraph Ave., Berkeley. Call: Bob Krones (510)653-5689 [Exp. #119.]

RE—AMIGA Redwood Empire Amiga User Group. Meetings: 2nd Tues., 7:30 pm, Rohert Park Jr. HS, RM. C-5, 7165 Burton Ave., Rohnert Park. Call: (707)523-9978. BBS: (707)795-2717. [Exp. #120.]

APPLE

PAUG—Peninsula Apple User Group. Meetings: 3rd Thurs., 7:00 pm, Ampex Cafeteria, 411 Broadway, Redwood City. Beginners and advanced, question and answer, new product demos, public domain software. Call: (415)367-8657. [Exp. #120.]

TVAUG—Tri-Valley Apple II User Group. Meetings: 1st Wed., 7:00 pm, Glendale Federal Bank, 3101 Crow Canyon Rd., San Ramon. Software demonstrations, raffle, public domain software, question and answer session. Call: Jerry Carleton, (510)828-0959. [Exp. #120.]

AT&T

AT&T Computer Users Group. Meetings: 1st Wed., 7:00 pm, 50 Fremont St., 40th Floor—near 1st and Mission, San Francisco. Refreshments, technical support, and informal discussions. Also, Sunnyvale DOS and UNIX groups. Call: Jim Lansing, (415)885-6631. [Exp. #119.]

AT&T UNIX Users Group-South Bay. Meetings: 3rd Wed., 7:00 pm, PM new user education. Call: Thad Floryan, (415)961-5157 or USNET: thad.cup.portal.com. [Exp. # 119.]

ATARI

ABACUS (Atari Bay Area Users Society). Meetings: 1st Sat. 10:00 am, Christ Church Lutheran, Quintara St. at 20th Ave., San Francisco. Supporting Atari computer users. MIDI and DTP SIGs. Call: Riger Sinasohn, (415)469-7924. [Exp. #118.]

Atari Unlimited. National networking and support. Write: PO Box 691, Mountain View, CA 94042. Call: Patti Barbiero, (415)903-9787. [Exp. #119.]

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Bay Area Atari Users Group. Meetings: 1st Mon., 7:30 pm, Agnews Aud., 2nd fl., San Jose. Write: c/o 3691 Eastwood Cir., Santa Clara 95054. Call: Steven Lee, (408)988-3878. BBS: (408)986-0215. [Exp. #122.]

San Leandro Computer Club. Meetings: 1st Tues., 8:00 pm. San Leandro Public Library, 300 Estudillo Ave. 8/16/32-bit, SIGs. Call: Jim, (510)872-1244. [Exp. #122.]

STace—Atari Computer Enthusiasts. Meetings: 3rd Thurs., 7:30 pm. Pac Tel Bldg., 3260 Sebastopol Rd., Santa Rosa. Call: Kim Remick, (707)795-8173. [Exp. #120.]

CAD

Berkeley Macintosh CAD User Group. Meetings: last Tues., 7:00 pm, San Francisco Apple office, 10th Floor, One Bush Street, San Francisco. Call: Steve Lukrofka, (415)665-1776. [Exp. #120.]

Contra Costa AutoCAD User's Group. Meetings: 2nd Sat., 1:00 pm, 1333 Willow Pass Rd., Suite 203, Concord. All CAD users welcome. Call: (510)687-5666. [Exp. #120.]

Marin AutoCAD Users Group. Meetings: 1st Thurs., 6:30 pm, Eldeon Beck Associates, 171 Carlos Dr., San Rafael. Call: Gini Bollinger, (415)491-4722. [Exp. #120.]

Russian AutoCAD Users Of America. Meetings: 2nd Wed., 6:00 pm, Rosenberg School, 5133 Geary Blvd., San Francisco. Call: Michael Belilovsky, (415)387-7764. [Exp. #120.]

SF AutoCAD User Group. Meetings: 1st Mon. Call: Mark Williamson, (415)383-4060. [Exp. #120.]

Sonoma County AutoCAD Users Group. Meetings: 3rd Tues., Piner High School, Rm. H83, Santa Rosa. Call: Bud Schroeder, (707)987-3108. [Exp. #120.]

COMMODORE

C=HUG (Commodore Hayward User Group). Meetings: 2nd Sat., 2:00 pm, Palma Ceia Park. (510)531-3734. [Exp. #122.]

CWEST Commodore 64/128. Meetings: 2nd. Wed., 6:30–8:45 pm, Excelsior Library, 4400 Mission, San Francisco. San Francisco. Call: (415)626-9946. [Exp. #122.]

DESKTOP PUBLISHING

BMUG Desktop Publishing And Design Sig. Meetings: 3rd Tuesday, 6:30 pm, SF Police Academy, 350 Amber St., San Francisco. Call: Les Cowan, (415)641-6033. [Exp. #122.]

Ventura Publishing User Group (formerly VPUG). Meetings: 3rd Mon. (Sept.–May), 6:45 pm, 1800 Rollins Rd., Rm. 14, Burlingame. Call: Elinor Cruz, (415)366-5317: [Exp. #122.]

IBM AND COMPATIBLES

Berkeley PC User Group. Meetings: 2nd Tues., 7:00 pm, Winners Circle Systems, 2618 Telegraph Ave., Berkeley. No charge, newsletter $24/yr, free PD library, beginner SIG, GeoEnsemble SIG. Call: Mel Mann, (510)526-4033. [Exp. #119.]

EastBay FOG. Meetings: 2nd Wed., 7:30 pm, Episcopal Church of St. John-in-Montclair, 1707 Gouldin Rd., Montclair. All microcomputers, MS-DOS, CP/M. Call: (510)653-2627. [Exp. #118.]

Fremont PC User Group. Meeting dates vary. Fremont Central Library. Topics: latest in public domain CD-ROMS & how to install a CD-ROM drive. Call: (510)795-4286 ext. 7. BBS: (415)652-1736. [Exp. #120.]

Golden Gate Computer Society. Meetings: 4th Mon, 7:00 pm, San Rafael Community Center, 618 B St., San Rafael. Free intro to computers class at 6:00 pm. Call: (415)927-2909. [Exp. #121.]

Peninsula Computer Club. Meetings: 2nd Thurs., 7:00 pm, Social Room, 222 Laurel St., San Carlos. DOS and CP/M libraries. Call: Larry Welling, (415)593-9981. BBS (415)571-9259. [Exp. #120.]

San Francisco Business Computers. 110 Pacific #153, San Francisco. Call: (415)788-5338. MCI mail: 425-1545. [Exp. #122].

San Francisco PC Users Group. Meetings: 3rd Tues., 6:15 pm SIGs, 7:30 pm General Meeting. Fort Mason, Bldg. A. Call: (415)979-5879. [Exp. #122]

South Bay WordPerfect User Group. Meetings: Monthly, dates vary. Saratoga Community Library. Free. Call: Scott Maiden, (408)253-4591. [Exp. #122.]

Stanford Palo Alto Area PC User Group. Meetings: Last Wed., 7:30 pm, Varian Aud., Stanford. Call: (415)329-8252. [Exp. #122.]

LEGAL

SF Bar Assoc. WordPerfect User Group. Meetings: 3rd Wed., noon, SF Bar Assoc. Boardroom, 7th fl., 685 Market St. Brown bag meetings. Call: (415)421-5650. [Exp. #119.]

MACINTOSH

A32 Macintosh User Group. Meetings: 2nd Sat., 10:00 am, Sunnyvale Community Center, 550 Remington Ave., Sunnyvale. Question and answer, guest speakers, disks-of-the-month, bimonthly newsletter, $35 annual dues. (408)263-0398. [Exp. #122.]

Diablo Valley Macintosh User Group (DVMUG). Meetings: 3rd Tues., 7:00 pm, Bancroft School, multipurpose room, 2200 Parish Dr., Walnut Creek. Get together w/Mac and Performa users. Enjoyable SIG meetings. Call: Connie, (510)827-5775. [Exp. #122.]

Gay Macintosh User Group. Meetings: 4th Mon., 7:00 pm, New Conservatory Theatre, 25 Van Ness, San Francisco. GMUG is a nonprofit group open to everyone. Call: (415)552-GMUG. [Exp. #119.]

International Macintosh Users Group (IMUG). Meetings: 3rd Thurs., 7:00 pm, Apple Computer, R&D Campus, 1 Infinite Loop, Cupertino. A forum for people using Macintosh computers in different languages. Call: Roger Sherman, (415)859-5146. [Exp. #122.]

Macintosh SIG. Meetings: 3rd Tues., 7:00 pm, Apple Cafeteria, City Center 4, De Anza and Rodrigues, Cupertino. Sponsored by Software Entrepreneurs' Forum. Call: Jeff Cherniss, (408)356-9901, or Barbara Cass (408)854-7219. [Exp. #122.]

PAUG—Peninsula Apple User Group. Meetings: 3rd Thurs, 7:00 pm, Ampex Cafeteria, 411 Broadway, Redwood City. Beginners and advanced, question and answer, new product demos, public domain software. Call: Roger Laker, (415)367-8657. [Exp. #120.]

SPC Apple User Group. Meetings: 2nd Tues., 7:30 pm, Fremont Main Public Library. The Society for Prevention of Cruelty to Apple Computers Users Group supports all Apple and Macintosh computers. Call: Dean Fearn, (510)881-9160. [Exp. #122.]

Stanford Macintosh User Group (SMUG). Meetings: 1st Mon., 7:00 pm. Call: (415)363-2446. [Exp. #118.]

MARKETING

Marketing SIG. Meetings: 4th Thurs., 7:00 pm, Cubberley Community Center, Rm. H-1, 400 Middlefield Rd., Palo Alto. SIG of Software Entrepreneurs' Forum. Call: Bill Ryan, (415)615-7906. [Exp. #119.]

MULTIMEDIA

Design SIG. Meetings: 3rd Tues., 6:00 pm. For independent businesspeople in graphic arts and word processing. Topics related to running own business. Call: Bill Brent, (415)282-7368. [Exp. #120.]

Macromedia User Forum. Meetings: 1st Wed., 7:00 pm, 600 Townsend, at 7th St., San Francisco. Authoring, 3-D, content, and tools. Call: (415)252-2295. [Exp. #120.]

Multimedia User Group. Meetings: 1st Wed., 7:00 pm, Contract Design Center, Main Lobby, 600 Townsend St., San Francisco. $3 at door. Call: John Dowdell, (415)665-3916. [Exp. #118.]

North Bay Multimedia Association (NBMA). Meetings: 3rd Thurs., 7:00 pm, Semantic, Novato. Call: Lee Callister, (415)883-0449. [Exp. #119.]

SEF Multimedia SIG. Meetings: 1st Thurs., 7:00 pm, Center for Software Development, 111 W. St. John Street, Suite 200, Downtown San Jose. SIG of Software Entrepreneurs' Forum. Call: Ralph Gilman, (408)746-0551. [Exp. #122.]

NETWORKING

NetSIG. Meetings: 4th Tues., 7:00 pm, Novell Sunnyvale. Networking SIG for Software Developers. SEF group. Call: Skip Addison, (408)283-3545. [Exp. #119.]

NOVELL

Silicon Valley Novell User Group. Meetings: 3rd Wed., 6:30 pm, Sundowner Inn, 504 Ross Drive. Call: Stephanie or Beth, (408)522-8690. BBS: (408)739-8753. [Exp. #122.]

OS/2

OS/2 Bay Area User Group. Meetings: 4th Mon., 7:00 pm. For anyone interested in OS/2. Presentations, product demos, questions and answers. Call: (415)755-3124. [Exp. #122.]

PARADOX

Bay Area Paradox User Group (bapals). Meetings: 4th Tues., except June and July, 4th Wed., 4:30 pm, McKesson Bldg., 1 Post St., 18th floor, San Francisco.

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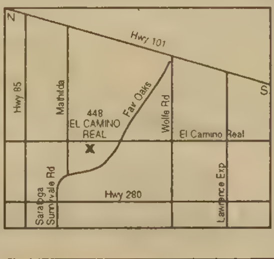

USER GROUPS continued...

Call: (415)995-4688. [Exp. #122]

PEN COMPUTING

Pen Software SIG. Meetings: 4th Wed., 7:00 pm, Cubberley Community Center, Rm. H-1, 400 Middlefield Rd., Palo Alto. SIG of Software Entrepreneurs' Forum. Call: Bill McAlpine, (415)348-2257. [Exp. #119.]

PROGRAMMING LANGUAGES

North Bay Forth Interest Group. Meetings: 2nd Sat., 1:00 pm, 2055 Center St., Berkeley. Tutorial at noon. Call: Leonard Morgenstern, (510)376-5241. [Exp. #122.]

SEF Visual Basic SIG. Meetings: 2nd Thurs., 7:00 pm, Cubberley Comm. Ctr., Rm. H-1, 4000 Middlefield, Palo Alto. Call: Allan Colby, (415)851-4657. [Exp. #122.]

Silicon Valley Forth Interest Group. Meetings: 4th Sat., 10:00–5:00 pm, Applied Biosystems, Inc., Conference Room A/B, 230 Lincoln Centre Dr., Foster City. Call: C.H. Ting, (415)571-7639. [Exp. #122.]

Visual BASIC SIG. Meetings: 2nd Thurs., 7:00 pm, Cubberley Community Center, 4000 Middlefield Rd., Rm. H-1, Palo Alto. Sponsored by Software Entrepreneurs' Forum. Call: Allan Colby, (415)851-4567. [Exp. #119.]

Visual C++ Bay Area Developer's Group. Meetings: 3rd Wed., 6:00 pm, Berkeley. For agends, location, and RSVP, Call: (510)254-9700, ext. 490. [Exp. #119.]

TEXAS INSTRUMENTS

TI-99/4A. Meetings: 2nd Sat., Oakland. Call: Fred, (510)530-8335. [Exp. #122.]

UNIX/XENIX

N. California UNIX SIG. Meetings: dates vary. UNIX, XENIX, LINUX, Coherent. Beginners welcome. Call: Randy Just, (707)769-1648. BBS: (707)754-1431. Email: rjust@justcomp.com. [Exp. #120.]

UNIX SIG. Meetings: 2nd Tues., DEC Aud., 130 Lytton Ave., Palo Alto. Sponsored by Software Entrepreneurs' Forum. Call: (415)546-4950. [Exp. #119.]

UNIX/Xenix SVUG. Meetings: 3rd Wed. 7:00 pm, Call: (408)745-7600. Fax-On-Demand info: (408)745-0740. [Exp. #118.]

VIDEO TOASTER

Video Toaster User Group. Meetings: Last Thurs.; 7:30 pm, HT Electronics, 275 N. Mathilda Ave., Sunnyvale. Special guests, equipment demos, hands-on workshops, plus info/tips on new System 3.0. Call: Andrew Timmins, (408)243-9233 (eve). [Exp. #120]

VIRTUAL REALITY

Silicon Valley Virtual Reality. Meetings: 2nd Thur., 7:00 pm, 922 Wedell Ct., Sunnyvale. Open forums, info sharing, and technology developments. Call: Algis normantas, (408)745-7600. [Exp. #118.]

WINDOWS

BAWOW—Bay Area "Windows on Wall Street" User Group. For people interested in actively following the stock market using this revolutionary new software. Call: Dave Ittner, (510)796-4528. [Exp. #122.]

Windows SIG South. Meetings: 1st Wed., 6:30 pm, Cubberley Community Center, Room H-1, 4000 Middlefield Rd., Palo Alto. Software Entrepreneurs' Forum. $10 for nonmembers. Call: Barbara Cass, (415)854-7219. [Exp. #122.]

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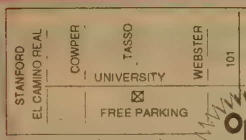

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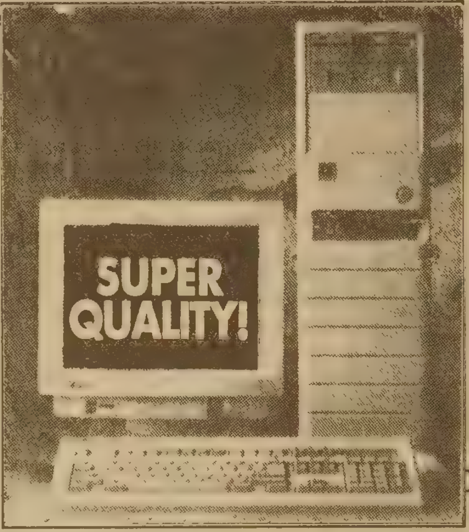

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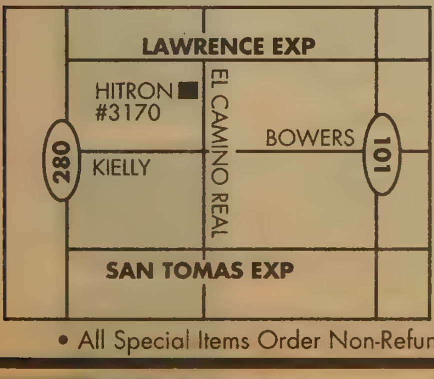

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RELEASE 3

3D STUDIO

Awesome PC Modeling And Animation From Autodesk

BY RICHARD RAUCCI

3D Studio Release 3 from Autodesk is a high-end photorealistic modeling and rendering package that can also generate broadcast-quality animation. It also has the rare ability to achieve workstation-level performance on the ubiquitous PC platform—I used a 486 with an Intel-compatible DX/33 with 8MB of RAM in reviewing the package, and had no difficulties whatsoever.

REQUIREMENTS

3D Studio installs from eight 1.44MB floppy disks. Installation runs a batch program which copies the files into a directory on your hard disk.

The minimum space required for full installation is 20MB, and the install program won't check for space first. If you don't have enough space, the batch file will keep installing files until it runs out of space.

Disk-compression software can incorrectly judge the amount of space left on a hard drive. Graphics files (like the materials maps in 3D Studio) are often already tightly packed, and loading them to compressed hard drives can result in an "out-of-space" message even when you think you've cleared enough space.

Autodesk recommends 20MB for the program and at least an additional 20MB for files that you create. This will work, but 40–60MB is better; files, especially animations, take up a lot of space, and the Phar Lap DOS subsystem needs the space as well. Phar Lap DOS Extender is automatically installed, and uses hard drive space to simulate RAM; 3D Studio only loads Phar Lap when it starts, so the program doesn't interfere with your current DOS configuration. You'll need a minimum of 8MB of RAM; thanks to the DOS Extension system, this works well, but you'll want more for better performance.

After loading files, the install program

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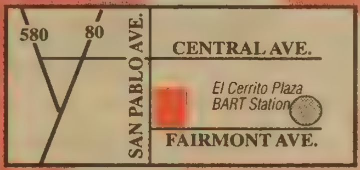

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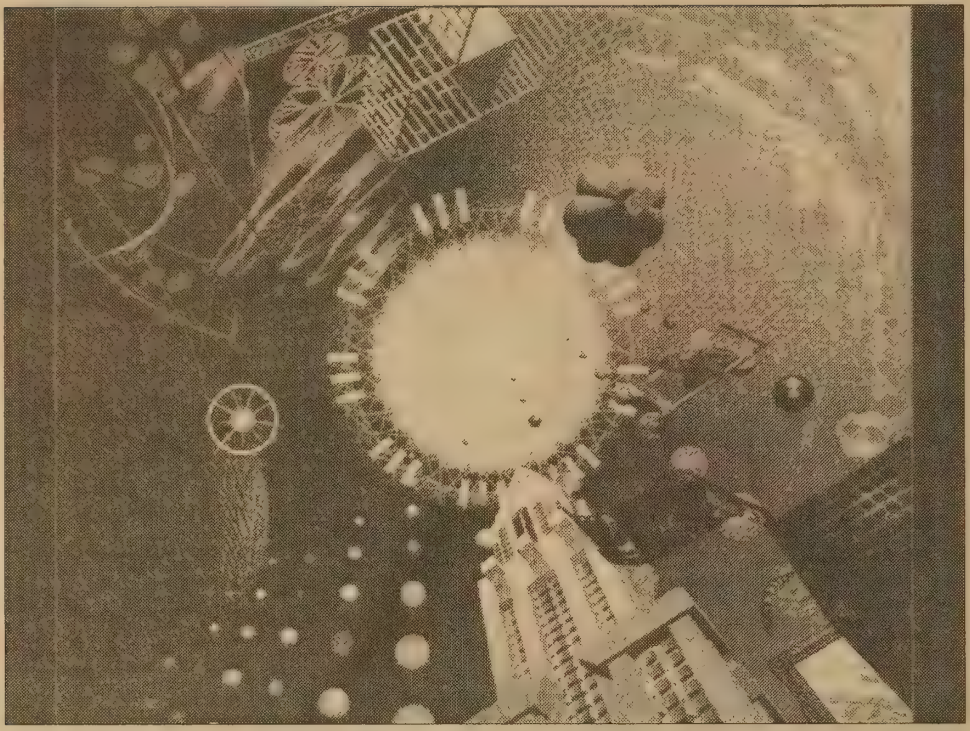

runs the Vibrant graphics setup menu. From a scrolling list, you can pick drivers for a good range of SVGA video cards, and configure them for rendering, hard copy output, and animation viewing. 3D Studio's minimum video card requirement is VESA-compliant 8-bit, 256-color mode, at multiple resolutions. The program defaults to 800 x 600 mode, but also works with 640 x 480. Higher resolutions with millions of colors are also supported with the proper drivers.

After installation, you can edit the 3DS.SET configuration file for faster rendering. Under the Rendering Parameters section, change the RENDER-BAND-HEIGHT from the default of 10 to a higher number. You can do this editing with DOS 5.0/6.0's Edit program, or with the Text Editor built into 3D Studio. (Doing this could increase the RAM you may need.)

Windows 3.1 is also supported, but you'll have to install 3D Studio support by yourself, by moving the program information file and the icon file to your Windows directory, and by configuring a Phar Lap driver in your System.ini file. 3D Studio is stable under Windows 3.1, but Windows' overhead detracts from its performance. Running under Windows is only recommended if you want to run multiple instances of 3D Studio at the same time, or if your network has a Windows front-end, and you want to do Network Rendering.

Lastly, you'll have to play with your dongle. This is a plastic circuit box that attaches to the parallel port of your PC. 3D Studio checks for this when it starts, and periodically polls it during operation. Without it, the program won't run or will shut down. You can still render from the command line, and you can install the program on multiple DOS machines for network operation.

I will abstain from commenting on infernal copy protection schemes, and will just state that when you install the dongle firmly (screw it into place), it works transparently; the pass-through port for my printer gave me no troubles.

OVERVIEW

The main features of 3D Studio R3 are grouped into five modules, each of which builds upon the others. These include the 2D Shaper, the 3D Lofter, the 3D Editor, the Materials Editor, and the Keyframer. Each module shares a menu bar, with pull-down sections for loading files, setting parameters, adjusting drawing aids, and more. In addition, all of the modules except the Materials Editor have the same basic layout, which consists of one to four viewports. The viewports allow for multiple-perspective views of your objects.

On the upper left of this layout is a hierarchical menu layout similar to AutoCAD, which controls the special functions of the particular module. The lower left controls are a series of icons for zooming in and out of views, aligning viewports, switching between selection sets, and selecting objects. The consistent interface between the different modules makes the learning curve for 3D Studio relatively short.

The basic starting point for 3-D rendering is often a 2-D concept drawing. The 2D Shaper module is a complex drafting asset for doing just that. With it, you can create the basic planar shapes that make up a 3-D object. In the framework of this program, the Shaper is used in conjunction with the 3D Lofter. The Lofter then moves the 2-D object through space to make it in three dimensions.

SHAPER

The Shaper has tools for creating and modifying a variety of shapes. You can also operate directly upon vertices (where lines join), to extend and deform edges. AutoCAD .DXF files can be loaded into the Shaper preparatory to rendering, and you can save your own 2-D templates. You can use custom font files, including Adobe Type 1 (.PFB) typefaces. Text placement is easy, and 2-D vertices are automatically generated that can be adjusted to customize type styles. The Shaper also works with Adobe Illustrator .AI files.

LOFTER

The Lofter transforms 2-D objects into 3-D objects, but its complexity and power go beyond this simple definition. Not only can objects be rotated around a simple circular path, but custom paths can be generated as well. There's also a custom feature that can make spiral and helical paths from a single plane, and a great visual editor for adjusting the angle of a loft.

You can also make a 3-D preview. The Lofter's powerful sculptural features are essential to understanding and creating complex 3-D objects from 2-D designs. Once you've completed the loft, you can transfer it to the 3D Editor for more manipulations.

3D EDITOR

3D Studio's 3D Editor is the heart of the rendering engine of the program. In conjunction with the Materials Editor, it can make stunning photorealistic images from objects. As a rapid prototyper, it works well.

The 3D Editor contains many drawing tools like the 2D Shaper, but for generating 3-D objects. In many cases you can bypass the 2D Shaper and Lofter and work in the 3D Editor—it's the default module open when you start the program.

Here you can create shapes in three dimensions. These shapes are made up of faces, which are angled according to their position in the object. For example, a simple cube will have only six faces, but a simple

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Autodesk 3D Studio Release 3.0, $2995
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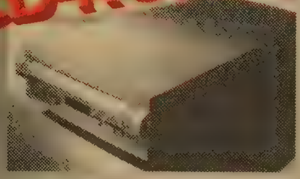

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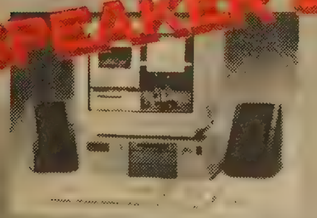

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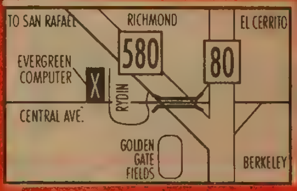

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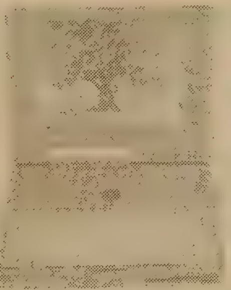

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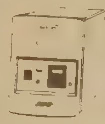

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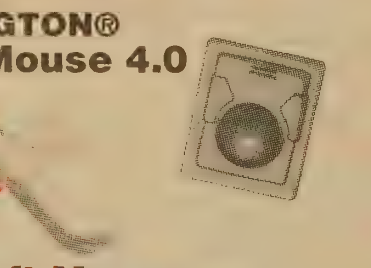

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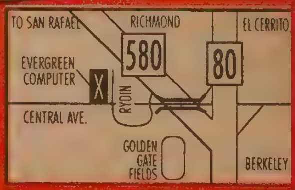

sphere will have many more. You can choose whether an object will be smooth or faceted (this controls the number of relative faces used to make up an object), and you can operate on any of the faces independently.

The editor includes controls for deforming an object. I especially liked the skew command—it allows you to bend standard objects into interesting shapes by clicking on their wirefame outlines in the viewport and slewing them about.

3D Editor lets you clone objects, to plant a row of trees, for example. You can work in very fine detail by zooming in on surfaces. For example, you can set up a very large room (like a banquet hall) by cloning several rows of tables. Then you can zoom in on each table, and create a 3-D place setting. In the larger view, these objects will render correctly, and add realism. Snap-to-grid tools help such precision alignment work.

> 3D Studio uses a camera metaphor to create views of objects and scenes that will then be rendered with an appropriately photorealistic look.

Lighting is an essential part of any 3-D scene, and the 3D Editor has good lighting control. You can adjust the intensity of lights, and use either omni lighting for an overall effect, or adjustable spotlighting. A nice feature is the Place HiLite command, which allows you to select an area on your object to receive a highlight, then choose which light will deliver it. The light will then automatically move to the proper position. Light color can also be adjusted, and you can control hues, saturation, and luminance, as well as attenuation (light falloff).

Another important aspect of 3-D work is the camera concept. Since a visualized scene has to have a viewpoint, 3D Studio uses a camera metaphor to create views of objects and scenes that will then be rendered with an appropriately photorealistic look. The virtual cameras come with a large selection of lenses, from a 15mm fisheye to a 200mm long. Placing cameras is easy, and you can use a field-of-view cone projection to help keep an object in view. 3D Studio also supports normal camera movement, so you can dolly, roll, and pan around your scene. A switchable camera viewport gives a clear view of any changes you make.

Perspective camera controls are included, which make for a very dramatic effect. When you use perspective on an object it will automatically adjust itself, changing its dimensions to reflect a realistic perspective view.

MATERIALS EDITOR

Once you've got your objects created, set your lights, and placed cameras, you're almost ready to render. This is where 3D Studio's powerful Materials Editor comes into play.

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The Materials Editor is also used to show the effects of 3D Studio's different rendering styles. You can select a texture, overlay it with a pattern, change its color, adjust the hue and saturation, change the specular, diffuse, and ambient light properties, and even apply self-illumination! The supplied mapping files you can use are in industry-standard TARGA, .TIF, .GIF, and .BMP formats, and you can use paint programs to create and import your own.

Drag-and-drop features make it easy to change color swatches, generate new samples, and queue texture and pattern files.

After creating a material sample with the properties you want, you can then switch back to the 3D Editor to apply it to objects in the scene. Generating mapping coordinates for this purpose is as easy as clicking on the object. You then assign the material to it, and you're ready to render. If you preselected the object in the 3D Editor, you don't even have to leave the Materials Editor. Selecting Auto Put from the Materials Editor control panel will do this automatically, and you can invoke the renderer from there as well.

You can set up a very large room (like a banquet hall) by cloning several rows of tables. Then you can zoom in on each table, and create a 3-D place setting. In the larger view, these objects will render correctly and add realism.

Rendering with 3D Studio is great. The main selection controls are in the 3D Editor, and you can choose to render by viewport, region, blowup, or object. By rendering each viewport, you can generate precision top, front, and side views, as well as camera shots. Regional rendering allows

continued on page 316

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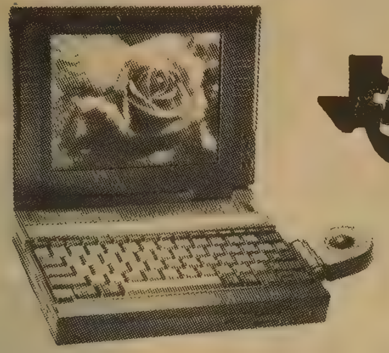

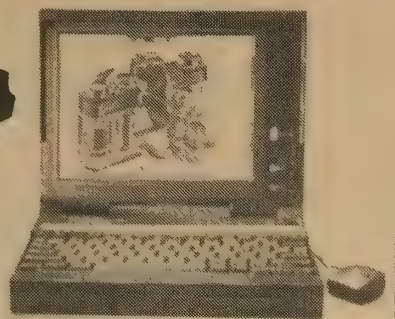

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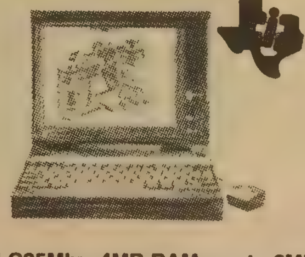

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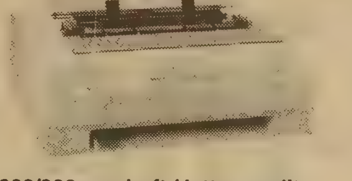

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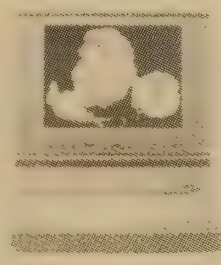

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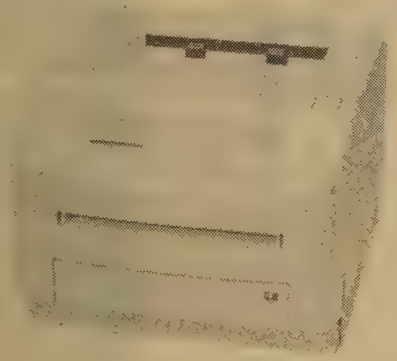

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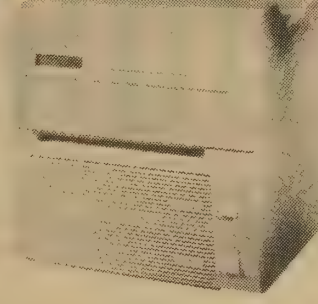

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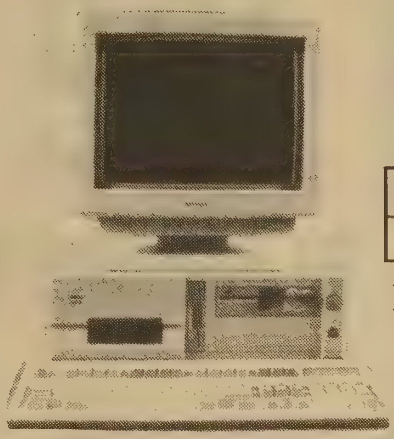

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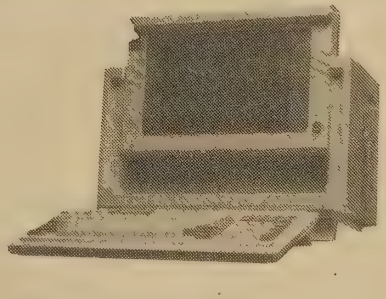

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The State Of The Toaster

An Overview Of NewTek's Latest

BY DOUGLAS J. NAKAKIHARA

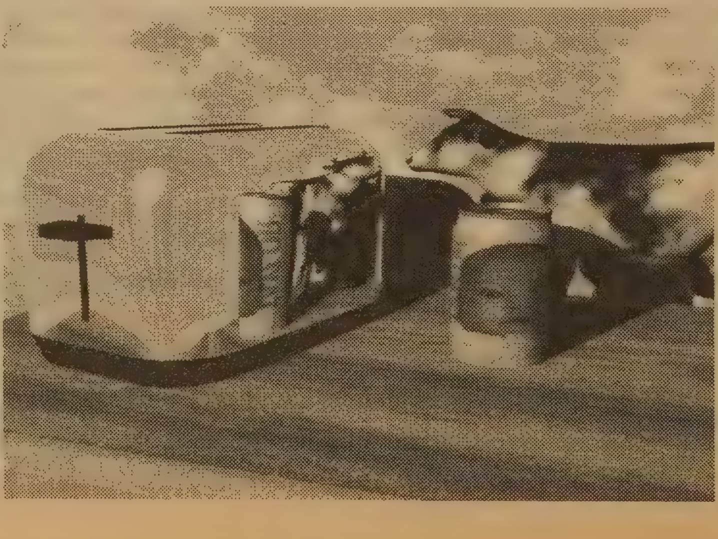
NewTek's Video Toaster is often discussed, but many people don't really understand what it is or what it does—how can a "kitchen appliance" help the professional videographer edit wedding videos and also produce the computer graphics for NBC's *seaQuest DSV*? Also, the fact that the Video Toaster is based on the Commodore Amiga—a non-mainstream computer—contributes greatly to its mystique, and to the confusion.

The following discussion is not a detailed review of the product, but rather an attempt to explain the Video Toaster to those who aren't familiar with its capabilities.

WHAT IT IS

The Video Toaster is really a card that plugs into the Amiga's special video slot. (For brevity's sake, I'll generally refer to the product as the Toaster, but be aware that the newest version is technically called the Video Toaster 4000.)

The original Toaster was made for the Amiga 2000. When the Amiga 3000 was introduced, it was found that the Toaster would not fit into the new Amiga design without modification. The Toaster 4000's



"Toaster table with milk and soda," Lightwave rendering by Douglas J. Nakakihara!

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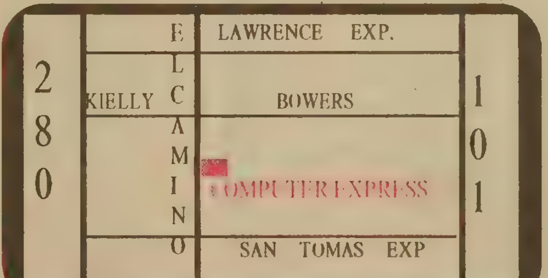

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486DX-33/256C ORCHID VLB	438	598	786	836	896	918	1,126	1,166	1,186	1,216	1,256	1,446
486SLC2-66/64C IBM VLB	260	398	586	636	696	718	926	966	986	1,016	1,056	1,246
486SLC2-50/64C IBM VLB	208	348	536	586	646	668	876	916	936	966	1,006	1,196
486DX2-66/128C VLB	498	648	836	886	946	968	1,176	1,216	1,236	1,266	1,306	1,496
486DX-50/128C VLB	478	608	796	846	906	928	1,136	1,176	1,196	1,226	1,266	1,456
486DX2-50/128C VLB	358	508	696	746	806	828	1,036	1,076	1,096	1,126	1,166	1,356
486DX-33/128C VLB	338	474	662	712	772	794	1,002	1,042	1,062	1,092	1,132	1,322
486DLC-40/128C VLB	144	280	468	518	578	600	808	848	868	898	938	1,128
486DX2-66/128C EISA	628	768	956	1,006	1,066	1,088	1,296	1,336	1,356	1,386	1,426	1,616
486DX-50/128C EISA	598	728	916	966	1,026	1,048	1,256	1,296	1,316	1,346	1,386	1,576
486DX-33/128C EISA	458	588	776	826	886	908	1,116	1,156	1,176	1,206	1,246	1,436
486SLC2-50C IBM ISA	174	324	512	562	622	644	852	892	912	842	982	1,172
486DX2-66C ISA	468	618	806	856	916	938	1,146	1,186	1,206	1,236	1,276	1,466
486DX-50/128C ISA	468	608	796	846	906	928	1,136	1,176	1,196	1,226	1,266	1,456
486DX2-50C ISA	338	508	696	746	806	828	1,036	1,076	1,096	1,126	1,166	1,356
486DX-40/128C ISA	320	458	646	696	756	778	986	1,026	1,046	1,076	1,116	1,306
486DX-33C ISA	314	454	642	692	752	774	982	1,022	1,042	1,072	1,112	1,302
486SX-33C ISA	164	324	512	562	622	644	852	892	912	942	982	1,172
486SX-25C ISA	134	294	482	432	592	614	822	862	882	912	952	1,142
486DLC-40/64C ISA	138	276	464	514	574	596	804	844	864	894	934	1,124
386DX-40/64C	98	234	422	472	532	554	762	802	822	852	892	1,082
386SX-40	70	228	416	466	526	548	756	796	816	846	886	1,076
386SX-33	64	222	410	460	520	542	750	790	810	840	880	1,070

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VIDEO TOASTER
4000

Toaster 4000 title screen

modular design has solved this form-factor problem, and also takes advantage of the new graphics power available in the Amiga 4000.

A major misconception is that the Toaster is a standalone machine. This originated because NewTek initially sold Amiga 2000s with the Toaster and its software preinstalled, with the result that the purchaser often was unaware of buying an Amiga; the Amiga name plate was covered up with a Video Toaster sticker. Though NewTek has discontinued this practice, the Toaster card still comes with Amiga-masking stickers which many dealers use on Toaster-equipped Amigas.

WHAT IT DOES

The Toaster allows you to create broadcast-quality video using relatively inexpensive equipment. The Toaster has several key functions: digital video effects, framegrabbing, chroma effects, character generation, genlocking, luminance keying, image painting, and 3-D animation.

The Toaster's power is really in its software. It was designed this way so that upgrading would be easy and cheap. This philosophy is somewhat imperfectly realized, in light of the need for Toaster 4000; however, the fact remains that most of the Toaster's functionality is not hard-coded into its chips.

The Toaster card has six composite video BNC connectors on the back, four for input and two for output. The BNC connectors are easily adaptable to the more common RCA-type jacks and a few adapters are included.

One output is called the Main output; the other is called Preview. Generally, Main shows what the end viewer will see; Preview displays the upcoming video source. It's best to use two monitors for these outputs, but you can use a switchbox with a single monitor. The monitors can be regular color TVs, if they have a composite video input jack. (Note: a total of three monitors, including the regular Amiga computer monitor, is the most common setup.)

Additionally, there are two digital buffers that can be used as video sources. The digital buffers are conceptually places to "hold" various types of Toaster graphics. A solid color buffer is also available. Any one of the video sources can be individually selected to show on the Main and Preview screens.

DIGITAL VIDEO EFFECTS

The Toaster's Switcher allows you to bring the Preview video to the Main display using a digital video effect (DVE)—this is the heart of the Toaster. The DVEs include nearly every flip, tumble, spin, peel, wipe, and zoom transition you can think of. The ones using the likeness of NewTek spokesperson Kiki Stockhammer and the color 3-D animations are standouts in the hundreds of available transitions, some of which include audio. Three speeds are built in; you can also control a transition manually if you wish.

FRAMEGRABBING

Framegrabbing allows you to capture a still image from moving video. You can framegrab an image from any of the video inputs by simply clicking a button. These images are referred to as "framestores," and can be saved and loaded to and from a digital buffer. Framestores use a proprietary file format, but most Amiga image processing programs now support it.

TIMEBASED CORRECTION

Because the Toaster expects all video signals to be properly synced in order to perform its mixing magic, a device called a timebase corrector (TBC) is normally required. Video tape recorders, for example, spew out very unstable signals due to tape stretching and varying tape speed.

You can use multiple live video cameras without a TBC, if they have the ability to be synced together—a feature most consumer-grade camcorders lack. Also, a single live video camera can be used without problem, though you'll only be able to switch between it and a digital buffer. Note: If timebase correction is necessary, you'll need a separate TBC for each external video source. Both internal and external TBCs are available and priced from under $1000.

CHROMA EFFECTS

These effects change the color of a video signal based on brightness levels, giving the video a psychedelic 60's look. These types of effects are also used on science fiction programs to depict something unnatural taking place. You can set up your own chroma effect, if none of the ninety-nine predefined ones fit the bill.

CHARACTER GENERATION

This feature allows you to place text and graphics over video. Everyday examples are scrolling TV credits and overlaid sports graphics. The combination of text and 24-bit semi-transparent 3-D graphics is very popular on broadcast TV these days and is easily achievable with the Toaster. PostScript fonts are supported; 275 of them are provided with the Toaster.

GENLOCHING

You can overlay Amiga computer graphics over video using the Toaster's genlock capabilities. The Toaster's genlock features are very basic; however, it's functional and will be adequate for many needs.

LUMINANCE KEYING

Luminance keying is similar to genlocking, except the video source is overlaid on the graphics (or another video source), like a TV weatherman over a map of the US. (However, when you see this on TV, it's usually done by chromakeying rather than luminance keying. With chromakey, a certain color, normally blue, becomes transparent. Luminance keying uses brightness and is more difficult to get right. However, results can be very impressive, as demonstrated in the Toaster's demo tape.)

IMAGE PAINTING

ToasterPaint is a basic paint program and identical in most respects to NewTek's old DigiPaint program. It uses the Amiga's standard HAM mode which provides 4096 display colors at a 320 x 200 resolution, but internally tracks colors using 24 bits. Unless you use the limited 1x mode, you must scroll around a framestore with only about one-quarter of the image visible at any one time. ToasterPaint can be useful for touching up framestores, but doesn't have much to offer in the way of image processing.

RESOURCES:

Video Toaster 4000, $2395
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> **A feature only available with the Amiga 4000 is the ability to play back 256,000-color animations at 30 frames per second.**

3-D ANIMATION

The Toaster's 3-D animation feature is really a separate program called Lightwave. This feature is nearly totally independent of the Toaster's video editing capabilities—some people never use the Toaster's video capabilities and only use it for 3-D animation, and vice versa.

With the original Toaster it was difficult to play a Lightwave animation at 30 frames per second without using an expensive single-frame recorder. A feature only available with the Amiga 4000 is the ability to play back 256,000-color animations at thirty frames per second. Playback time is limited by available RAM, and you'll only get a few seconds on a 18MB machine. This should be enough, though, for many applications.

Lightwave's broadcast television credits are numerous. Most notably, it is used to generate all of the computer-generated images (CGI) for NBC's *seaQuest DSV* and the upcoming *Babylon 5* series. It was also heavily used in pre-production work for *Jurassic Park*. One major reason for Lightwave's tremendous popularity is its interface, the best I've ever used or seen for any 3-D animation program.

To capitalize on the Amiga's low cost and make up for its consumer-level computing power, some companies have networked several Amigas (each with its own Toaster) together to render animation frames simultaneously. NewTek's new product, the Screamer, a Lightwave peripheral capable of rendering frames forty times faster than previously possible, will make this less of a necessity.

INSTALLATION

Installation is fairly easy using the step-by-step instructions provided in the manual. The card comes preconfigured for an Amiga 4000 and requires disassembly for installation in a 2000 or 3000. This is not a minor task; I'd definitely recommend seeking help from a knowledgeable dealer or friend, if you are not comfortable with doing such things. Note: When mounted in an Amiga 4000, the Toaster card covers a

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Enhance your video productions without cleaning out your wallet! Four color controls allow you to adjust "sunlight" (brightness), color saturation (really gives life back to washed-out videos), flesh tones and color tint (useful for videos taped with a camera that did not have color balance set). Two other controls let you adjust image resolution and picture sharpness, while a pair of controls let you suspend the processing so you can see the effect of what your are adjusting. Switchable between two different inputs (video only, not RF). Inputs and outputs are RCA jacks. New in box with manual, 90 day warranty.

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12843	Romex Staples, white plastic saddle, 1/2", bag/100
230	Coax cable for video games, 75Ω, with RCA connectors, 15 ft.
13095	3M stick-on rubber feet, 3/4" square, grey, sheet of 24
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12511	Heatsink Paste, 1 Oz. tube

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HSC# 14576	$59.00

Windows Revival

You say you missed out when we had our special on OEM packaged sets of Windows 3.1? Well, you've got one more chance, as we were able to turn up a limited quantity of these Texas Instruments labeled packages of Microsoft Windows 3.1 on 3.5" disks (with manual). Hurry, though, it may be your last chance! HSC# 14434

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second slot, leaving only two open. This does not occur in the 2000 and 3000 due to their different slot arrangements.

The Toaster 4000 software ships on forty-five floppy disks and takes a good hour to install. Sixteen of these disks are high-density and are only used for the Amiga 4000. Nine megabytes of RAM and 90MB of disk space are required when installed on an Amiga 2000 or 3000; 10MB of RAM and 110MB of disk space on a model 4000. If heavy use of Lightwave is anticipated, an '030 or better processor is recommended, along with additional RAM.

Once I'd installed the software, I was ready to connect my camcorder and monitors. It was then that I ran into my first stumbling block: except for a tiny loose sticker naming the connectors, whose orientation is left up to interpretation, the manual never indicates which connectors do what. Fortunately, a quick call to a friend of mine cleared this up and I was soon off and running in button-clicking Toaster-heaven.

If you're a Toaster novice like myself, you'll probably find the numerous tutorials to be exercises in futility and frustration. They don't begin to provide enough detail to learn this complex beast. I spent most of my time trying to figure out what button I was suppose to select to carry out the tutorial's instruction. Now I understand why there are so many "how-to" products available for the Toaster—essentially, you have to already know the software to successfully finish the tutorials. I suggest you go through the reference section first before attempting the tutorials. For humorous reading, note that the limited lifetime warranty is for a period of one year. (Life is so short...)

WHO NEEDS IT

Though the initial investment for the Toaster is affordable for the average consumer, the sky is the limit from there. TBCs, VCRs, monitors, video cameras, lights, computer hardware and software, and all of the other peripherals and accessories can easily push the price tag to the tens of thousands.

However, the weekend videographer can still have lots of fun with just a basic Toaster setup, though you'll probably want at least one TBC—it all depends on how serious you want to get.

An average person with a camcorder can have lots of fun with the Toaster. Professional videographers have been making money with the Toaster since its release. The Toaster is used at TV stations, cable companies, animation houses, video production houses, and sports stadiums across the country.

If 3-D animation interests you, Lightwave is a proven network-quality professional tool.

Admittedly, there are a few would-be Toaster products for the PC and Mac, as well as the Amiga, with some features that out-perform the Toaster. However, considering all that it has to offer, the Toaster is still king of the hill—it even won an Emmy! Furthermore, the one thing you can bank on is that NewTek is not resting on its laurels—the Toaster will continue to get better and better. ■

Correction

In issue 115, it was incorrectly reported that Allen Hastings, the author of Lightwave, works for Amblin Imaging. He works for NewTek, the makers of the Video Toaster.

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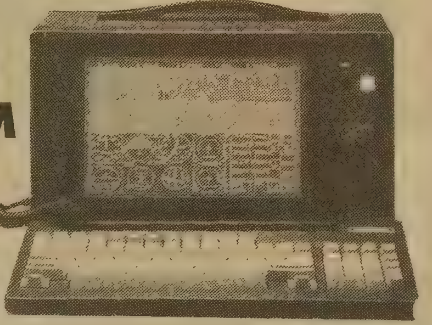

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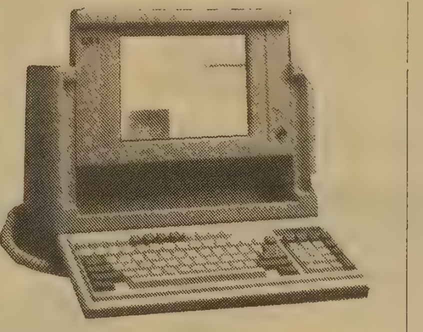

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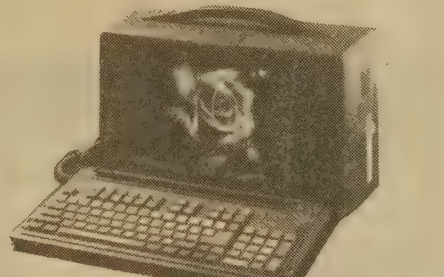

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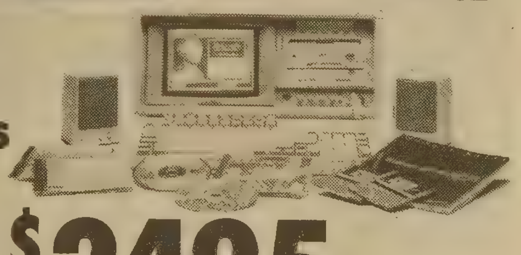

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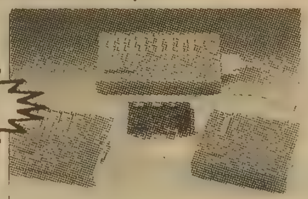

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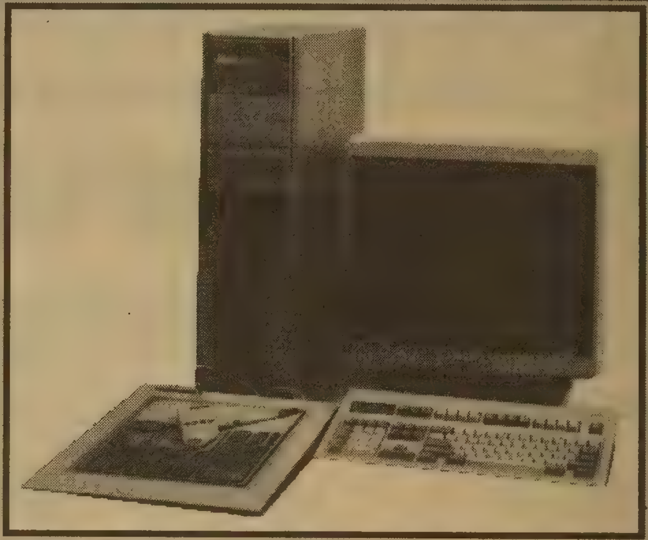

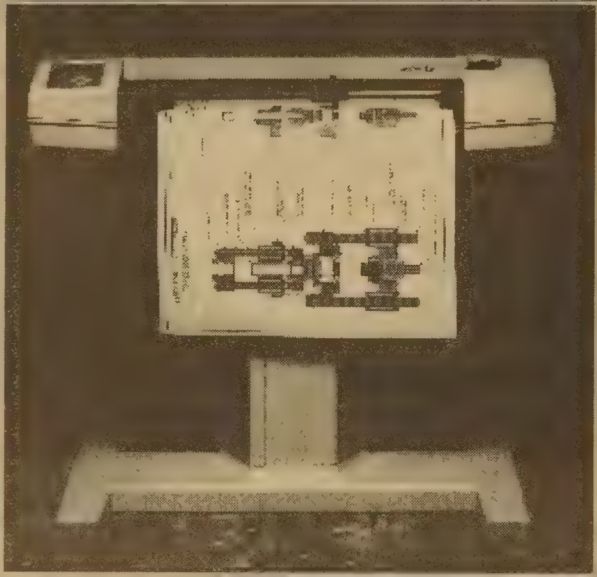

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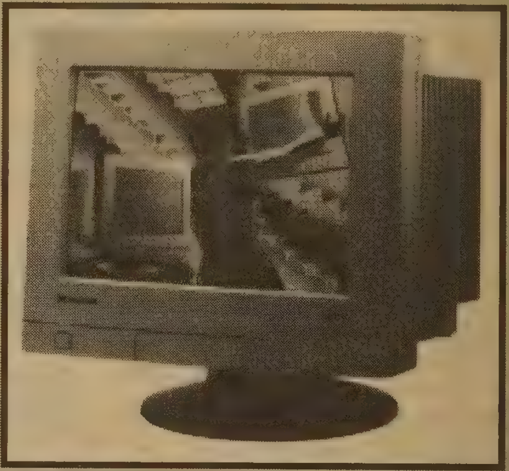

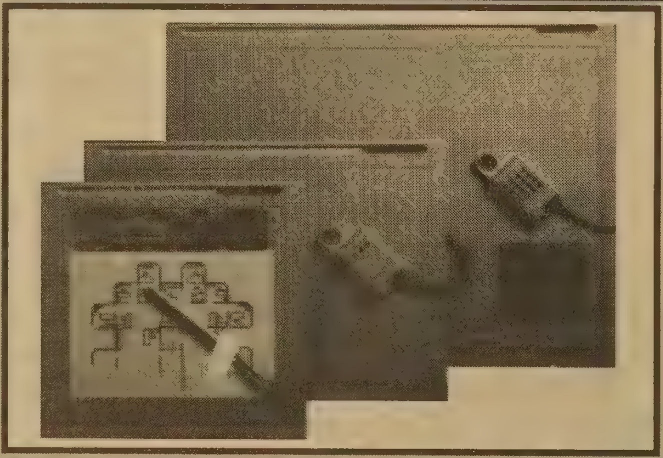

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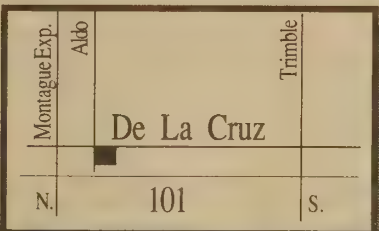

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MULTIMEDIA 101

Medio Revisited

Three MPC Titles

BY JONATHAN E.

In our November 15 issue (#115), I featured the thoughts and words of the three characters who form SBD Productions, the jokers behind the CD-ROM title Midnight Movie Madness. At that time, the manufacturing of the disc was not complete; my commentary on the title was limited, being based on an abbreviated demo running off hard disk rather than the actual product.

Since then, I've spent some time with the finished version and also with the two other Medio Multimedia titles briefly mentioned in that column. Some further analysis of the titles is offered in this column to illustrate the design and implementation issues that developers—or producers or publishers, whatever you wish to call them—have to contend with as multimedia crosses the boundary between projected future and marketplace reality.

BASIC SETUP AND VIDEO

All three of Medio's titles come with a setup routine that tests your system's video capabilities, whether you have the suggested 256-color support or only sixteen, and whether you have an audio board installed. With no audio board, you're stuck with no sound. If you only have sixteen colors, the video will run, but slowly, and it will dither a lot.

If more than half the video frames are skipped during the test, the program runs using Medio's own Fast Video Playback. This reduces the frames per second to only twelve instead of fifteen, and brings the resolution down to 240 x 180 from 320 x 240. You can toggle between this Fast Video Playback mode, the standard mode, and full-screen playback.

The bad news is that none of these modes is more than barely adequate. You certainly get an idea of what's going on in the video, but to call the picture quality grainy or pixellated would be kind. On a 33MHz 486 machine with a Sirius Logic video card I found the full-screen video to be virtually unwatchable, while the standard play had poor sound sync.

Medio's Fast Video Playback was the default winner, but the twelve-frames-

Copyright © 1994 by Jonathan E. All rights reserved. Jonathan E. has worked with desktop multimedia since 1988. He also writes about world music and the Archaic Revival for BAM. *His USPS mailing address is c/o SoundSwell, 54 29th St., Richmond, CA 94804. Email: jeve@well.sf.ca.us.*

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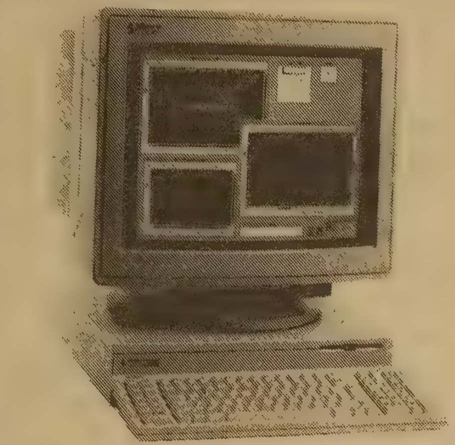

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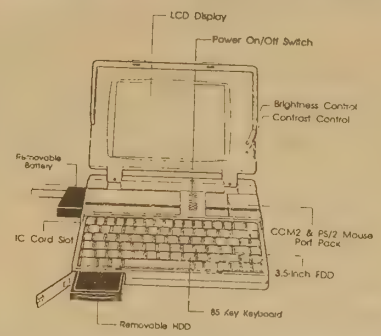

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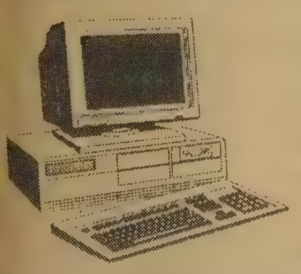

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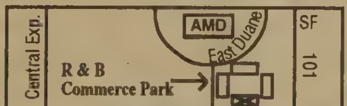

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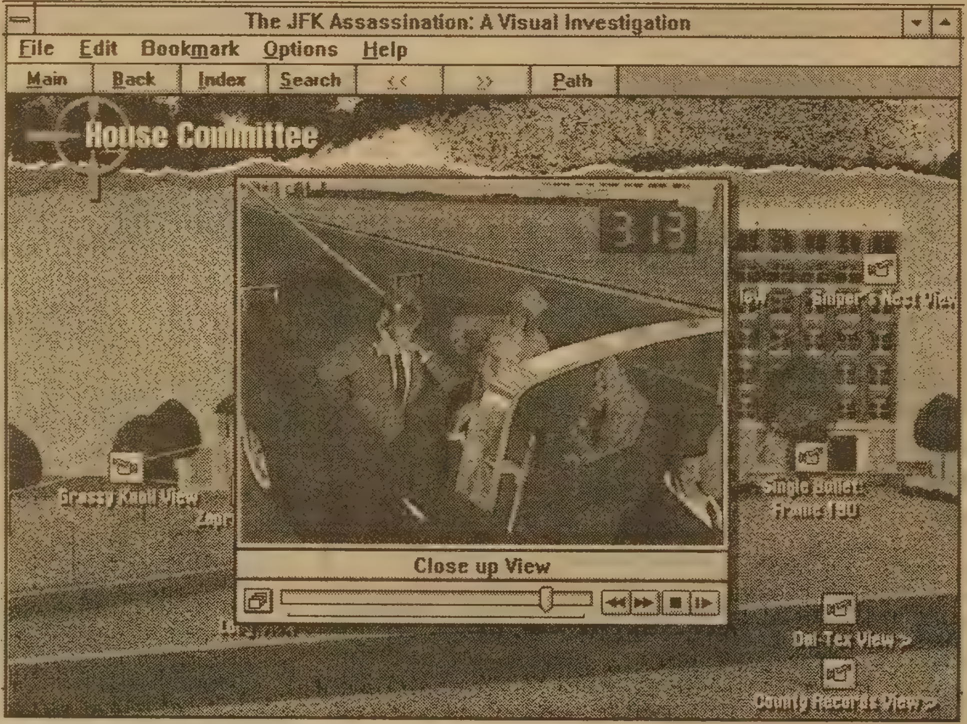
Prices Subject To Change W/O Notice • 2% OFF Cash Purchases per-second rate is borderline. In addition, the size of the picture is so small that it's like looking through the wrong end of a telescope.

None of this is Medio's fault—it's simply the state of what's generally available on consumer-level machines. I'm picky about image quality; there's a generation accustomed to playing what I consider graphically awful video games who don't seem to mind that kind of picture quality, but right now MPC video is not ready for prime time.

Of course, this will change—perhaps even by the time you read this. The pace of progress is fast and furious and raising the quality of video playback is clearly the number one economic and technical problem that must be solved to make multimedia titles really attractive to consumers.

The other event that occurs during this initial setup is what is euphemistically referred to as "a chance to view demos of other Medio products." While I appreciate the need to explore every marketing angle possible, and while in some ways this might be considered as no more than the equivalent of trailers for coming attractions before a movie or a list of an author's other works at the beginning of a book, I found it crass and irritating. To be fair, it was only about fifteen seconds of audio and a dialog box—and it only happens during initial setup and not on subsequent uses of the product—but it is too obtrusive and does not set the right tone.



Medio's J. F. K. Assassination—A Visual Investigation is a fair example of the potential benefits of multimedia, and also illustrates some of the inherent difficulties and a few relatively minor design problems.

J. F. K. ASSASSINATION

The Kennedy assassination is possibly the most exhaustively analyzed event in American history. Do we really need a multimedia title to add to the flood of material about that moment of history? Perhaps we don't actually need one, but Medio's J. F. K. Assassination—A Visual Investigation is a fair example of the potential benefits of multimedia, and also illustrates some of the inherent difficulties and a few relatively minor design problems.

On the plus side, the CD-ROM contains multiple digital media: video, including the Zapruder film and three other amateur movies of the motorcade; a large number of news photos; 3-D, computer-animated models showing various possible bullet trajectories depending on the assassination theory of your choice; maps and diagrams that allow you to take different positions around Dealey Plaza; audio voice-overs for newsreel footage and reading some stills captions; the entire text of three books—Jim Marrs' *Crossfire* (the basis of Oliver Stone's movie), *The Warren Commission Report*, and *The Assassination of John F. Kennedy: A Book of Facts*, plus other textual material.

There are good index and text-searching capabilities; the cross-referencing is more than adequate; you can bookmark material you want to come back to; it's easy to retrace your steps with the Path function or by clicking on the Back button; and in general it's pretty easy to find your way around. You have control of the relevant and important movies and animations with freeze frame, single frame advance, fast forward, and rewind, along with close-ups of significant details in the Zapruder film.

It's a lot of material—frankly far more than I could absorb to make any in-depth comment on the quality of its content—but its tone is sober and scholarly. The announced purpose of the title is to allow users to draw their own conclusions. I detected no editorial bias toward any particular point of view; certainly the sources of the content are widely varied.

The navigational design is a well-organized, multi-layered, branching structure. At the top level, you have a choice of going to any area at the next level, each of which basically contains one media type: Intro, Overview, Dealey Plaza, Films & Photos, Analysis, or Text. Depending on the amount of information in an area, you may have several more choices before you get to any content. If you choose Intro, you go straight to a narrated series of newsclips, but if you choose Films & Photos, you then have a choice of four movies or the Photo Library. If you choose the Photo Library, you have another choice of what

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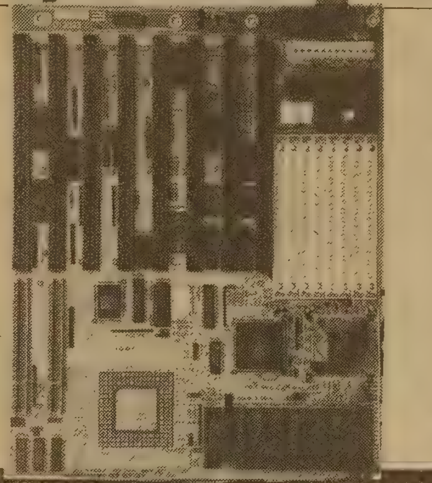

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Sept . 1992
Volume 1 Number 6
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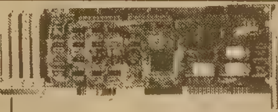

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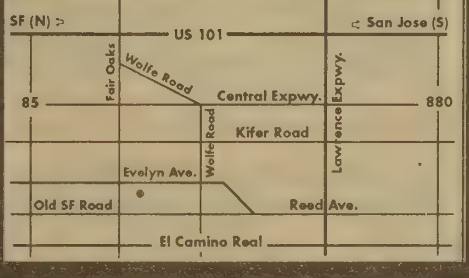

category of photos you wish to see: JFK, Dealey Plaza, Oswald, Funeral, Evidence, or Principals.

Each of these categories is in fact consecutive with the others. Once you're in the Photo Library, you can page through all the photos without having to go back up a level to get into the next category, which means that if you wish to skip a category—the autopsy photos are gruesome and gory, maybe you'd rather not look at them today—you have to go back up and reenter the Library through another category. This would be easier to do if you knew that you were looking at the last photo of a category through the use of a # of # scheme. However, ultimately it's a trade-off, since it can be equally frustrating to have to go back up a level and down again, which is what you have to do to get to the next movie.

An added irritant in this title's case is that there is no on-screen button to take you back up one single level. There's a button on the sub-menu bar that will take you back to the top-level original choices, or you can use the Back button to page back one page at a time, or you can pull down the Path menu and select the last time you were on the next higher level. If you've gone through a lot of pages, that can mean a lot of scrolling. If you entered the section through the index or some other lateral path that higher level will not show up on your Path.

One of the biggest tricks in interface and navigational design is minimizing mouse movement and the number of clicks needed to get you from one place to another: I believe that in this sort of structure a single click to raise you a level or take you to the next item on the same level is generally worth a little screen clutter.

It's a testament to the overall quality of J. F. K. Assassination that this was the most annoying problem I came across. The video quality has the same drawbacks discussed earlier, but the original quality of the footage is mostly not very good anyway. The still photos are of good quality. The sound occasionally breaks up, and I could not discern why some captions were read faithfully, some read only approximately and some not at all.

I found one button that was supposed to play a movie, but instead took me to the next movie. The palette management causes some flashing between different sections. These are generally minor details that do not significantly affect the utility of the title.

A problem that does affect that utility is the color-coding scheme in the Analysis section to show the differences between the various theories of the number of shots fired. Something just does not communicate here, which is particularly unfortunate since it has the potential to be a valuable explanation of what might have happened. A solution to this problem might be for there to be a printed (on paper!) explanation of the graphics for simultaneous reference—anathema to

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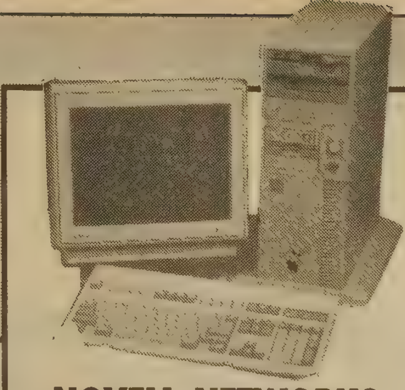

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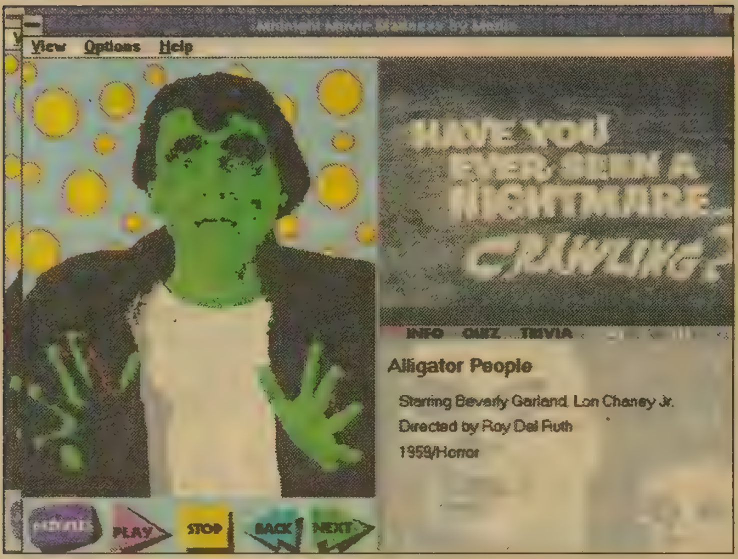
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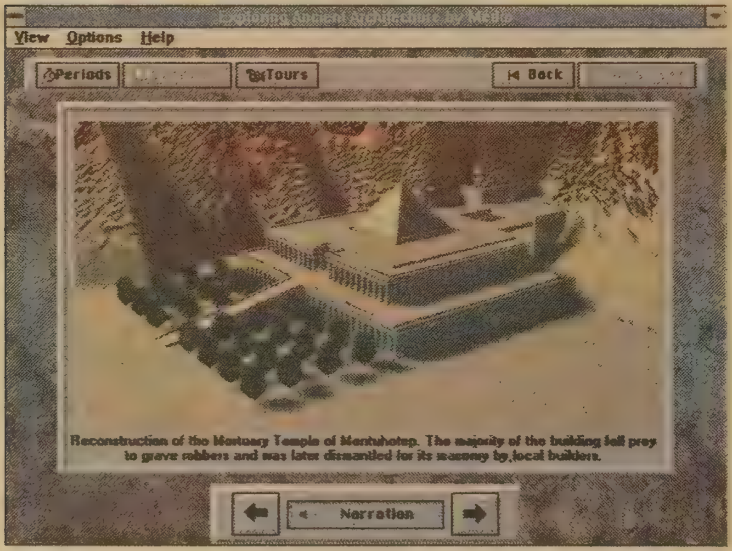

Reconstruction of the Mortuary Temple of Mentuhotep. The majority of the building fell prey to grave robbers and was later dismantled for its masonry by local builders.

some multimedia CD-ROM designers, but if the medium does the job, use it!

MIDNIGHT MOVIE MADNESS

The content of Midnight Movie Madness is basically thoroughly silly—but at least it's sometimes fun to play with. Gilbert Gottfried as the fake Geraldo is obnoxious, but hit the space bar and you're rid of him!

The Spirit of the Drive-In has an irritating but in-character voice. The sound is a little garbled and much of what he says isn't worth hearing anyway—but some of what he says really does hit the spot and I found myself clicking again and again just to get one of my favorite randomly selected phrases. Clicking on his hands causes short musical selections to play, again randomly selected. Rapidly repeated clicking can produce some interesting sounds. It's fun to click on the movie screen and get one of twenty clips that may have played in an actual vintage drive-in theater.

The quiz is pretty weak. Part of the humor is supposedly that the third choice is funny—well, maybe it is to barely pubescent boys, but a lot of it is just stupid or offensive. The delivery is erratic. Occasionally the third choice is actually the right answer—but so what? Once you've figured out the right answer, you can boost your score by clicking on it again and again, steadily increasing your percentage score. It would be an improvement to be able to reset the score to zero without exiting the title and for two or more players to be able to compete (assuming that two people would want to do such an inane thing).

A few other improvements would be putting the movies in random order instead of the constant order you get when there are no categories of decade, director, or what-have-you selected; putting the name of the movie on the screen if you're in the quiz or trivia mode; and extending the selection area to where the indicator appears instead of only covering the type area. These are small details that would have added a little polish to a product that is basically an idiotic toy—but they're also details that might improve other products.

EXPLORING ANCIENT ARCHITECTURE

Medio's final title, Exploring Ancient Architecture, has a lot of potential but falls short on delivery. You have a choice of four periods: Neolithic, Egyptian, Greek, and Roman. Each has an overview, which is basically a narrated slide show, and also a tour of two buildings from the period (one in the case of the Neolithic).

The building tours using 3-D models are the real focus of the product. You can navigate your way around them using buttons to turn or go forward and can repeat your last movement with a slider bar under the video window. Your position in the building is shown on a plan by a red dot.

One problem is the general quality of the video: it's either too small or it's too grainy to really appreciate what you're seeing. However, a much bigger problem is that the navigational system produces an incredibly strange and dislocated sense of place—sometimes the buttons take you around right angles, sometimes you simply turn, sometimes you turn and move, sometimes your gaze tilts and rotates overhead. The red dot on the plan does not move with you synchronously but jumps to the next spot when the movement is completed. It has no pointer to indicate the direction you're facing. Due to the brightness of the dot, what you really want to do is drag it around to control your movement. Adding to the dislocation is the fact that sometimes you're accompanied by music or a narration explaining what you're supposed to be seeing and sometimes you're in sepulchral silence. Many of the sound clips come in with an unpleasant pop.

Basically this is a project with content that would have made a more satisfying linear TV documentary at this stage of its development. The idea is good but the execution is of rough demo quality. If it had even only a simple text glossary of architectural terms and a time line along with a navigational system akin to Myst's, it would be considerably improved as a multimedia product.

ACCESS

Medio Multimedia can be reached at 2703 152nd Ave., N. E., Redmond, WA 98052; phone, (206)867-5500. These titles require a 386SX or higher processor, 2MB of hard disk space, a VGA or better display (256-color support is recommended), Windows 3.1 or later, and DOS 3.1 or later. An audio board with speakers or headphones is also recommended along with a mouse or other compatible pointing device. The recommended retail price for each title is $59.95; all three are available as a bundle, The Explorer Collection, for $119. ■

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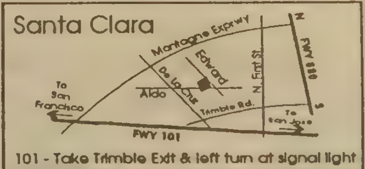

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"3-D FlyThroughs with Virtus VR“

BY TONY REVEAUX

Virtus VR is a $99-list 3-D modeling program for Macintosh (and, soon, Windows) that combines a very high level of performance with an easy entry and an affordable price.

It was written to leverage off the processing power of Motorola 68040-based Macs, and requires at least 4MB of RAM. I've been running it on a Macintosh Centris 650 with 8MB, and sometimes it seems as swift as a Sun workstation.

Virtus VR will be functional on 68030 Macs, and can work well on a color PowerBook, but you will have to be less ambitious and more patient. Occasional crashes should not be unexpected, and there may be Sound Manager conflicts encountered on the Mac AV series. The PowerPC beta version is reported to be a real screamer.

DESKTOP VR

Virtus calls the new product a "virtual reality" (VR) program. This is stretching things a bit, but—of the six or seven levels of VR—it certainly qualifies as a dynamite example of VR level #1, which is "desktop" or "window" VR.

What you see on your monitor is what you get, and you get a lot with Virtus VR. It allows you to invent, explore, and alter realistic 3-D worlds. You can fly around and through full-color planes, solids, objects, and environments that you can erect in minutes. You can apply this system to creating models and simulations for anything that is founded on three-dimensional massing as experienced through time. Home remodeling, commercial space planning, scenic design, scientific representation, legal reenactments, and recreational creativity are just some of the uses it can be put to.

The package comes with a video that shows what Virtus VR can do, and examples of how to do it. The Quick Reference card assembles into a desktop cube, appropriate for this title. The program comes with several fully assembled color 3-D sample scenes, including The White House, a regular house, the Hindenberg, and an undersea complex on the ocean floor. For

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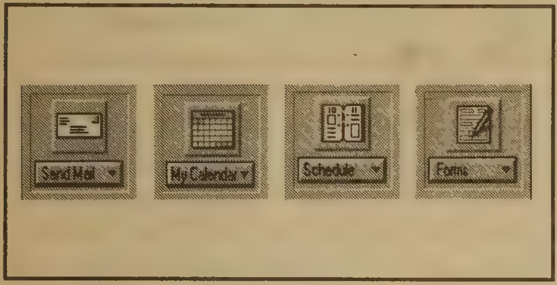

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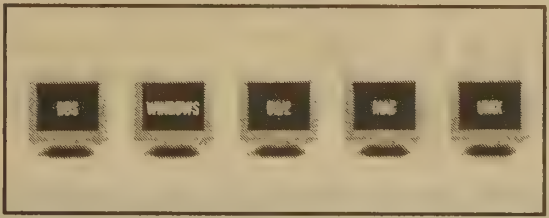

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those of you who want to make an eagle's-eye investigation of Dallas's Dealey Plaza, scene of the JFK assassination, this one is complete with Kennedy's open Lincoln and the fateful window picked out on the façade of the Book Repository. Plus (and I'm not making this up), there's also one of the Branch Davidian Compound including (at no extra cost) an armored assault vehicle.

UP AND RUNNING WITH VIRTUS VR

Virtus VR is an accelerated, aerobicized "lite" version of Virtus Walkthrough ($195), with some of the features of Virtus Walkthrough Pro ($395). With more optimized algorithms, Virtus VR runs about 30% faster than those more professional programs. Of course, you can always build more and run faster if you shift your desktop from color to black-and-white, and return to color for your final screens. But the system of the Macintosh that is hosting the program must include Color QuickDraw.

In the cause of speed and simplicity, Virtus VR is shorn of a lot of the creation tools and other measuring and codifying capabilities of the "heavy" programs. You can't create and save custom libraries of objects and attributes. Instead, you are dependent upon the Galleries of objects. It includes libraries such as basic and advanced shapes, landscape, farm, home, office, people, military, and space. Additional Galleries are being added, such as the Home Design and Science Fiction package for $29.95.

Using the Galleries couldn't be simpler. Instead of drawing a shape and extruding it, you just drag-and-drop the object from the Galleries Window into the Design Window. There, you can resize it and reorient it from here to next Wednesday.

If you want to modify the object, first you need to ungroup it. Then you can have a purple cow or a brick cadenza. Not only that, but you can scavenge the objects for construction elements. Those legs from the kitchen table are readymade lumber, and there are all kinds of neat shapes that you can score when you perform your own swords-into-plowshares conversions from the tanks and planes in the military galleries.

The shapes in the well-stocked galleries have enough variety that you can construct most of the designs that you would need. The 2-D Galleries supply many opaque and translucent shapes, including doors and windows, that you can apply to surfaces of 3-D objects.

They can prove to be tricky, though. When you drop them in the design window in a space by themselves, they can be hard to kill. You have to delete the 3-D object that the 2-D shape is bonded to, even if they are a mile away from each other.

Part of Virtus VR's modeling sophistication comes from its design containment, auto connection, and collision avoidance features. Design containment is a form of bonding or parenting between elements

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that allows them to move together and resize together. This includes objects within objects.

Auto connection is like electronic crazy glue; when you place two objects against each other, they will share the same surface attributes.

Collision avoidance is a feature that you can turn on and off from the Preferences menu. When it is on, and you are traveling through a 3-D shape like a building, you'll have to find the open doors, because you can't go through walls, floors or ceilings; a "bump" sound will reinforce that limit. When it is off, you can coast through the walls like Casper the Ghost. This can be very useful, if somewhat disorienting. It's the only way you can explore the vast interior of the Hindenberg's gas bag, for instance, and it allows you to swoop through The White House with the ease of the FBI.

Another advantage Virtus VR has over Walkthrough is the ability to add textures. Like Virtus Walkthrough Pro, its Walk Window has a higher resolution renderer, allowing the clarification of smaller details and finer pixel elements; it also gives you higher quality hard-copy printouts.

Adding a texture to a surface face, or over the entirety of a grouped or auto-connected object, is as easy as changing the color selection from the color picker window. A library of textures is included in the program. They include some very realistic brick, sky, and turf. More good news is that you can add any PICT file to that library by simply dropping that PICT into the Textures folder in the program folder; it will then appear under the Custom submenu. That means that you can draw from the great variety of graphic clip art packages out there, and the libraries of color textures and backgrounds like the Wraptures CD-ROMs from Form and Function.

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The most impressive quality of Virtus VR is its walkthrough, or flythrough, motion control animation. Its detail, speed and flexibility approaches that of graphic workstations, or at least a megged-up Quadra. But it's all in the software. Even in the "slowest" mode under the Walk Menu, my Centris 650 pushes the display so fast that I often expand the Walk Window to full screen to help slow it down; otherwise I sometimes lose the object as it whizzes by.

Navigation is mouse-driven, either by moving the cursor in the Walk Window, or clicking on the Navigation Buttons below. There is no implementation of the arrow keys from the keyboard.

Coordination between the Design Window and the Walk Window will help you to see and find things. The Observer is a point of view (POV) reference in the Design Window that shows where the POV is in the Walk Window. Click and drag the Observer icon to wherever you want in relation to the objects in plan, front or right views, and the Walk Window POV will follow.

There is no collision detection active in the Design Window. You could drop the Observer into a closed area that had no entry, say the Roach Motel, and then examine the interior in the Walk Window. You may go in, but only the Observer can get you out!

Open one of the sample scenes, look under the Walk menu, select Play, and then sit back and watch. You will see enacted before you another strong feature of Virtus VR — its recordable motion mode. In these sample scenes, you're seeing recorded paths. You can create your own, in a sample scene or a model that you constructed yourself, by selecting Record. Recording a path and playing it back is taken care of within the program. You must have QuickTime in your system to save it out as a QuickTime MooV, where it can be used and repurposed independently.

You can also choose which window you want to record as a single frame Snapshot, and save as a PICT file.

Virtus VR is one of those programs that can be used just to show off a Mac '040, but most importantly, it brings solid model creation and animation within the skill-set and price range of anyone. ■

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caching is highly beneficial...but is usually not cost-effective in small multiuser systems with less than six users."

I am sparing you the technical details here, but in essence what it all means is that if OS/2's own caching does not help, hardware caching will not have a big impact in single-user, standalone systems.

OS/2 does provide software caching for both HPFS and FAT drives. And, indeed, IBM did suggest this as a possible solution to the performance problem:

"Part of your problem (as far as performance is concerned) is that the disk cache on your system is 64K for HPFS or FAT partitons. If you are running FAT, increase 64 to 512 or 1024 in the DISKCACHE statement. If you are running HPFS, add /C:512 or /C:1024 to the IFS=HPFS line. If you are running both file systems (which your config.sys indicates), add /C:512 to the IFS=HPFS line and increase 64 to 512 in the DISKCACHE statement. The above numbers are not set in stone, you may need to tune them to obtain optimal performance."

But here's the rub: caching consumes memory too! With only 1MB of free RAM left, and memory swapped at a rate of tens of megabytes, taking all free memory from applications and creating 1MB of cache may not improve, and can even hurt performance. Thus, indeed, to make the TIFF solution usable, there is no way around adding a significant amount of memory.

CONCLUSIONS
SO WHAT HAVE WE LEARNED AT THIS POINT?

First, OS/2 may use more memory, if available, than the minimum it requires to run (the last *CompuServe Magazine* just put it at 4MB, but you will not be able to do much with that even if OS/2 does run). Moreover, without good, user-accessible diagnostics software, it is difficult even for IBM to figure out where the memory goes, and even if they could, chances are the memory can't be released, at least not without some adverse effects elsewhere.

Second, OS/2 applications or even utilities use considerable memory, at least in part because they are probably not very efficient. Three very simple utilities take 1.5MB of RAM, and even with a 9MB presentation and 6.5MB TIFF files, swappers of over 50MB are too much. I have just received two word processors for review, one of which grew the swapper from 2MB to 9MB by just loading, and the developer of the other, a beta, admitted it consumes more memory than it should.

Third, at least some of the performance effects on users are due to applications' failing to take full advantage of OS/2. Thus, if Freelance made good use of multithreading, the user could at least continue to work while a presentation is slowly saved or printed. But because it does not, the user must wait idly for one task to complete. First-generation OS/2 applications may also have functional weaknesses like Freelance's display and import limitations.

Consequently, if you intend to use OS/2 as more than just a multitasker for DOS and Windows applications, get lots of memory—at least 16MB, preferably as much as your system board accepts—and as fast a hard disk as you can afford. Performance may not be acceptable without a decent software cache, and the memory must be sufficient not just for applications and data, but for the caching too. A 32-bit data path (e.g. EISA or MCA) and caching disk controller is recommended; and in multiuser server environments, a high-performance one such as DPT's SmartCache high-end adapters, which allow caches of up to 64MB, may be necessary.

A large memory, however, does not mean that one should not still prefer more efficient solutions than the TIFF one. So how about the other two options—metafiles and scanning? Stay tuned for more OS/2 adventures. ■

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(Static-RAM) chips, the PC designers have developed the technique of creating a special area of memory known as an external, or Level 2, cache. (The CPU has its own built-in area of cache within the chip itself, called a Level 1 cache.) The external cache uses the superfast SRAMs, and, when well designed, can markedly improve the operation of the main memory, which uses the cheaper DRAM (Dynamic-RAM) memory chips.

For most DOS applications, assuming a good cache design, 90% of the benefit of the cache comes from the first 32K of SRAM. Why does conventional wisdom call for a minimum of 256K? There are two factors at work here. The first is simple economics. Since SRAM is very expensive, including 256K raises both the price of the PC and the dealer's profit margin. Does 256K of cache really increase the PC's performance? If you're relying on the results from one of the popular benchmark tests, the answer is a very unsurprising "Yes!" But is that answer true for all purposes and PC users? No.

Worse yet, if the cache is poorly designed, it can actually degrade the performance of the PC. A simple test is to turn off your external cache, get out your stopwatch and measure the time it takes to do some of your regular tasks. Then turn the cache back on and repeat the tests. You may discover that your system is faster without the cache, as about 30% of those measured by Sofwin Labs, an independent testing laboratory, have proven to be. The design of the cache is far more important to overall performance than its size.

Regardless of the source of a particular benchmark, they all have one vital point in common: ☛ no one is accountable or responsible for either the accuracy of the test methodology or the relevance of the results to the actual performance of the system.

Once the clamor over configuration and components has quieted down, the next chorus of advice may well be about "testing" the models to see which one will run your software the fastest, and presumably help you to be the most productive. To save you the considerable amount of time that loading all of your software onto each machine and timing your standard tasks would take, an easy "short-cut" is offered—but beware! There are some hidden perils in this phase, too, that can hurt you far worse than the little dwarf's knife or the pirate's "Gotcha!" Losing the game is one thing, being misled into buying an inferior system is quite another.

ENTER THE BENCHMARK

If you look at a large percentage of the magazine ads and reviews, you'll see some quoted results of "benchmark" tests. What's a benchmark, and why is it important?

The original benchmark concept was a program that would do a specific set of tasks while keeping track of how long it took to do them, or, to see how many times the procedure could be executed within a specified time frame. For example: Create a datafile, write a thousand records and read those thousand records. Report how long it took to complete the task. The intent was to create a quick method of testing the operating speed of the computer system. If machine "A" took two minutes to run the benchmark, and machine "B" took three, obviously machine "A" was the better computer.

Benchmark, benchmark, test the machine
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Just as all that glitters is not gold
There's more to PC performance than you're being sold.

Today's benchmarks typically do a lot more than a single procedure, and their claims are correspondingly greater. Some are composed of instructions found in common application programs while others consist of some of the application programs themselves, stripped down for the purpose of conducting the test. Other benchmark tests attempt to compare the operation of the test machine against an arbitrary "average" PC, even if the supposed "average" is an otherwise obsolete machine that has not been sold in years.

One critical factor you need to keep in mind about virtually all benchmarks is that at best, they are approximations—they represent what the programmer thinks a "typical" user wants to do with a PC. Unfortunately, the unwary customer has no way of knowing if the benchmark programmer's approximation has any relevance to how the machine will actually be used in doing real work. Even if you wanted to investigate, to make sure that the *approximation* was somewhere in the ball park of your intended usage, the information isn't available. The specifications for the benchmark tests are usually proprietary information.

A second, even more critical factor to remember about benchmarks is that regardless of the source of a particular benchmark, they all have one vital point in common: no one is accountable or responsible for either the accuracy of the test methodology or the relevance of the results to the actual performance of the system. All risk is totally assumed by the user for operation, accuracy, and relevance—and for all decisions based on the test results.

To further complicate matters, the units of measure used by benchmarks frequently change from one version to the next, and are highly confusing at best, requiring careful legends at the bottom of the charts to inform you that "Bigger is better" or "Lower is better." The magnitude of the numbers is impressively high—millions is the current favorite—but the conservative reader is left with the nagging question: What are they really measuring here? Skidmarks, Win-flips, JakeMarks, and Gall-stones—what do they really mean? Are they really telling us anything at all useful about the quality of the machines they test?

LIES, DAMNED LIES, AND BENCHMARKS

Most of the time, the popular benchmarks are measuring what the computer is capable of when it is operating under a very light software load. This is akin to measuring your car's performance capabilities by putting the transmission in neutral and testing the redline RPM of the engine. When you load in the kids and head off into the mountains to go skiing, the redline RPM figure doesn't have a lot of relevance to how well your car will accelerate and its handling through the curves. Your Mileage May Vary should be a required label on all advertised benchmark results, for much the same reason as it is on automobile performance claims.

Except for those who fervently believe in benchmarking mythology, the cheating scandal that rocked the video-accelerator card market last spring exposed only the tip of the hidden iceberg of benchmark flaws. Speaking confidentially, PC system designers have admitted to giving way to pressures from the marketing department to make design changes that detract from real performance, but that make the system look better on some benchmark test. This practice is apparently widespread, and the losers are the customers.

LOST IN THE MAZE?

The hidden cost of conventional wisdom's free advice and the benchmarks' easy answers can be staggering. The "bigger is better/faster" school of memory cache configuration has cost business and personal PC buyers obscene amounts of wasted money over the past few years. Blind acceptance of benchmark claims has prompted the selection of inferior designed PCs over more powerful models as a result of "benchmark sweetening"—the practice of building a PC expressly designed to produce high benchmark scores at the expense of real computing power.

The potential for traps and expensive mistakes begins at the doorway to the arena of PC purchasing and specification. PCs are very complex pieces of equipment, designed and built in accordance with scientific principles and the laws of physics. As a result, there are no easy answers when it comes time to select and purchase such a powerful tool. It takes time, expertise, and careful research to match the design characteristics of a PC to the budget of its buyer and the power demands of the software systems that will be used on it.

If you are not equipped, as most of us are not, to conduct that research yourself—and you want to avoid the traps and costs of making inappropriate choices—you must find someone who can guide you. Like choosing a PC, the selection of guides and the weighing of their advice should also be done with care.

THIS WAY TO THE EGRESS

Choosing competent advisors for your PC search should begin with an assessment of their motives, for you need to feel confident that the guide is working for you, with the intent of getting the closest possible match between your needs and the capabilities of the PC. The sales representative in the store has an economic interest in selling you the most expensive PC that he can; whether he actually does attempt to "talk you up" or not, there is still the potential for a conflict of interest. There is also a question of competence—reps may honestly not know all that they should in order to give such advice.

The glossy advertisements with their blazoned claims of benchmark superiority are clearly targeted at your wallet. One way or another, you're paying for those ads—and there's a difference between advertising sizzle and the real "steak" of PC performance. Decide which you prefer, and act accordingly.

Avoiding the traps and succeeding at the game of PC evaluation and selection is undeniably challenging. The lure of easy answers is strong, and should be a warning indicator. Ignore it at your peril, lest you find yourself "in a maze of twisty passages, all alike"—with the contents of your wallet at risk.■

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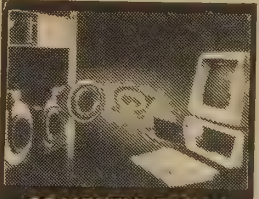

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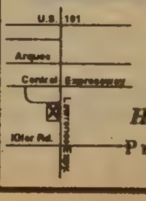

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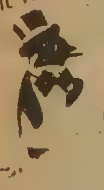

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V-30-10 V-30/20-10	10

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8087-1 10 MHz	110
80287-6 6 MHz	35
80287-8 8 MHz	39
80287XL 12 MHz (Laptop)	69
80287-10 10 MHz	35
80C287-12 MHz	35
80387SX-16,20,25	79
80387DX-16,20,25,33	79
80387DX-25 (Tube)	39
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3167-20 20 MHz (Tube)	$29
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3167-33 33 MHz	169
4167-25 MHz	299
4167-33 MHz	529
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83D87-40 40 MHz	$69
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83D87-25 25 MHz	59
83D87-33 33 MHz	59
83SX87-25 16 MHz	55
83SX87-33 MHz	59
IIT	
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80C387SX-33	69
8C387DX-20	59
8C387DX-25	59
8C387DX-33	69
8C387DX-40	69
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US 83C87 25/33 MHz DX	59
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27128-150ns	4^{00}
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27C020-150ns	7^{99}
27C010-150ns	5^{99}
27C040-150ns	13^{99}
514402-80 (1x4) STT, ZIPP	28
514400-80 (1x4) ZIPP	24
514400-80 (1x4) DIPP	45
514400-70 (1x4) SOJ	19
514400-70 (4x1) SOJ	17

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DeskPro 286N, 386N, 386SX/20	
2 MB Module	75
4 MB Module	175
DeskPro 386N, 386SX/20	
2 MB Module	118
DeskPro 286N, 386N	
0-4 MB Exp Board	175
DeskPro 386/33SL, 486/25, 486/33L System Pro	
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8 MB Module	239
32 MB Module	1700
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1 MB Kit	89
1 MB Exp Brd	229
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2 MB Module	85
Mdls 70-A21: A61, B21, B61	
2 MB Module	99
Mdls 55SX: 65SX: 55LS, 65LS	
4 MB Module	159
Mdls 80-111; 121, 311, 321	
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Mdls 80-A21; A31	
4 MB Card	215
Mdls 80-A21: A31	
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Mdls 90; 95	
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4 MB Module	259
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Contura Lite 20/25		
2 MB	129769-001	125
4 MB	129769-002	245
8 MB	129769-003	395
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4 MB	107653-001	310
Portable III		
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EBD	167811-001	225
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4 MB	118305-001	225
Deskpro 386S (E. Board)		
4 MB	11364-001	255
4 MB	112534-001	189
Deskpro 386/33L, 486/33L, 50/25		
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8 MB	116561-001	367
32 MB	116568-001	1475
6 Socket E Board		CALL
Deskpro 386/20e, 25e (E. Board)		
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8 MB	116561-001	335
32 MB	116568-001	1275
Deskpro 386/20e, 25e (E. Board)		
4 MB	113645-001	239
Deskpro 386/20,20e,25e		
4 MB	113132-001	189
Deskpro 286N, 386N, 386SX/20, 386/25M, 486/33M, 486S/25M, 486S/16M		
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4 MB	118690-001	345
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QMS LASER	
PS 410 2/3/4 MB	$119/165/189
PS 860, 1700 1/4/8 MB	53/133/166
PS 815, 825, 815MR, 2/4/6	168/232/295
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Brother HL-8E V 1/2 MB	99/139
Compaq Pagemarq 15 & 20 1/4/8	49/139/266
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Calendar Of Events *continued from page 246*

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February 1 & 8 Microsoft Access Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 1 & 8 Microsoft Word Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 2 Intro To Lotus 1-2-3 Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 2–9 Aldus Freehand Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 2 & 9 CorelDraw Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 2 & 9 Microsoft Excel Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 2 & 9 Paradox For Windows Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 3 & 4 Fundamentals Of Data Communications & Local Area Networks Seminar. San Francisco. Data-Tech Institute. Call: (201)478-5400.

February 3 & 4 Intro To DOS Class. San Jose. Mentor Training. Call: (408)433-0990.

February 3 & 4 Systems Testing And Quality Assurance Techniques Seminar. San Jose. Advanced Information Technologies. Call: 1-800-882-8684.

February 3 & 10 Harvard Graphics Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 3 & 10 Microsoft PowerPoint Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 3 & 10 WordPerfect For DOS Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 4 Intro To Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 4 & 11 Adobe Photoshop Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 5 CNE Hands-On Study Group. Oakland. Excel Micro Solutions. Call: (510)836-2040.

February 7 Intro To Microsoft Word For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 7 & 8 Intro To Networks Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

February 7–10 Principles Of Software Engineering Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

February 7–18 Interactive Multimedia Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 7–March 23 Symbolics Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 8–15 Photoshop 1 & 2 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 9 Intro To Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 9–March 9 Intro To FrameMaker 4.0 Course. Santa Clara. UC Santa Cruz Extension. Call: (408)748-7383.

February 10 Intro To Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 10 & 11 ISO 9002 Course. Santa Clara. UC Santa Cruz Extension. Call: (408)784-7383.

February 10 & 11 Microsoft Windows Class. San Jose. Mentor Training. Call: (408)433-0990.

February 11 Microsoft Word Print Merge Made Easy Class. San Jose. Mentor Training. Call: (408)433-0990.

February 11–18 Director 1 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 14 & 15 Data Communication And Networking Seminar. San Francisco. Center for Advanced Professional Development. Call: (714)261-0240.

February 15 Build And Upgrade An IBM PC Clone Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

February 15 Intermediate Lotus 1-2-3 Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 15 & 22 FileMaker Pro Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 15 & 22 Lotus 1-2-3 For DOS Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 16 Intermediate Word For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 16–March 2 Apple Media Tool Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 16 & 23 FrameMaker Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 16 & 23 Microsoft PowerPoint Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

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February 17 Intermediate Paradox Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 17–March 3 Aldus PageMaker Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 18 Intermediate WordPerfect For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 18 & 25 Microsoft Excel Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 21 & 22 PC Repair Two-Day Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

February 22–March 22 3D Studio Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 23 Intermediate WordPerfect Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 24 Intermediate Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 24 & 25 Intro To Networks Hands-On Workshop. Oakland. Excel Micro Solutions. Call: (510)836-2040.

February 25 Advanced WordPerfect Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 25–March 4 Director 2 Course. San Francisco. Center for Electronic Art. Call: (415)956-8500.

February 28 Intermediate Excel For Windows Class. Walnut Creek. Computer Education Center. Call: (510)937-2566.

February 28 & March 7 Lotus 1-2-3 For DOS Level 1 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 28 & March 7 QuarkXPress 3.1 Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

February 28 & March 7 WordPerfect For Windows Level 2 Class. San Jose. Mentor Training. Call: (408)433-0990.

MARCH

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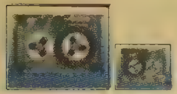

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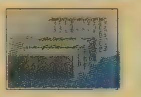

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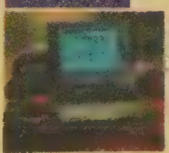

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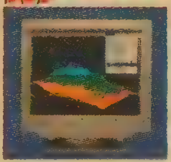

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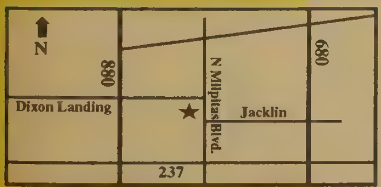

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tem. If you've changed your drive letters since the last boot, Stacker diligently searches for the the Windows permanent swapfile and makes sure that Windows knows where it is. The control program has ten notches to strike a balance between compression efficiency and performance speed.

Compressed drives created with Stacker v. 3.1 for DOS/Windows are also accessible under OS/2. To read them, you need the companion "Stacker for DOS and OS/2" product. If you start with Stacker for DOS and OS/2, you can compress drives with any version of DOS or OS/2—however, you don't get the ease of use under DOS 6 that you get with Stacker 3.1 or Doublespace. You also don't get Stacker 3.1's Windows accessories and fine-tuning compression options.

Under OS/2, you may may compress any FAT (File Allocation Table)-based partition, not IBM's HPFS (High Performance File System) partitions. HPFS and FAT partitions can coexist, but only the FAT partitions can be doubled under Stacker. The file format for compressed volumes is identical under both versions of Stacker, so you can start off with one package and switch to the other one later on. Or, you can run both versions simultaneously without mishap. (Partitions in Microsoft's Doublespace format are currently unreadable under OS/2.)

I found minimal degradation of performance accessing the same doubled partitions under OS/2 that I created with Stacker for DOS/Windows. You can even install OS/2 on a partition that has been previously "doubled" under Stacker, although this is a bit tricky.

RELIABILITY/PERFORMANCE ISSUES

Under the tests that I performed, all three compression products (SuperStor Pro, DOS 6.2/Doublespace, and Stacker) were stable, stuffing 1.7 to 2.0 times as many megabytes into the same available disk space. Windows, DESQview, and a series of TSRs and applications ran smoothly. I experienced no noticeable timelag in running programs, and no corruption of data. Copying a directory full of files to a compressed disk took approximately 5% more time than copying the same files to an uncompressed disk. This was constant with all three packages.

A Stacker compressed volume was able to store approximately 10% more kilobytes than a similarly-configured Doublespace volume and 12% more kilobytes than a SuperStor Pro volume. The Stac people also supplied a "reviewer's diskette" with a tortuous series of benchmarks to be performed on compressed volumes from all three products. Stacker came out of these tests as better able to track the deleted file space at the end of a volume and better able to handle problems caused by file fragmentation.

Both the DOS-6 aware module of Stacker and the new Doublespace required upgrades of the Norton Utilities and my memory manager, Quarterdeck's QEMM. Running AddStor's Doubletools under DOS 6.2 also required a special upgrade of that package.

Because of its flexibility and advanced user-options, Stacker is my favorite of the three packages, but Doublespace in DOS 6.2 has gone a long way toward adding safeguards and including features that were missing in the DOS 6.0 version. SuperStor Pro is a generation behind, but has the useful JPEG utilities for people who deal with massive bitmap files. ■

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WHAT IS BMUG?

BMUG is an educational nonprofit consumer advocacy group organized to share information, and provide critical direction to users and developers in the computer community worldwide. It is an independent advocate, not affiliated with any manufacturer, delivering trustworthy information and useful products.

Like any growing organization, it is many different things to its 14,000 international members. BMUG supports many Special Interest Groups (SIGs), an 18-line Bulletin Board System (BBS), software library, weekly meetings, publications, and much more. BMUG also puts out a semi-annual 500+ page book that we call our "newsletter."

Our motto continues to be: *We're in the business of giving away information.*

Come and join in the dialogue at the BMUG main meeting every Thursday evening, 6:30 to 9:30 (or whenever we finish), on the UC campus. BMUG West and BMUG South are monthly meetings held in San Francisco and San Jose.

The BMUG Office, 2055 Center Street (a half block from the BART Station) is open to the public 9 am to 5 pm. Please come by, say hello, and meet other members.

The BMUG Helpline provides volunteer technical assistance and telephonic hand-holding for our members. If your question can't be answered on the spot, we try get you in touch with someone that can help. Of course, not every problem can have a happy ending—but we try. Improve your Macintosh education, and help others by becoming a Helpline volunteer!

BMUG has one of the most up-to-date, comprehensive software libraries around with hundreds of disks filled with the latest versions of public domain or shareware programs. BMUG also produces CD-ROM collections, including the digital video TV-ROM ™Too, Font CD, and the BMUG PD-ROM.

Planet BMUG, our new graphical user interface FirstClass 18-line BBS offers many of the latest versions of files in our software library as well as news, private mail, rumors, etc. With our multiline capability, you can have access to BMUG almost 24 hours a day. It's easy to use, fun, and a great resource.

BMUG can be found on most electronic services. BMUG can also be reached through the Internet network through UG0001@aPlelink.aPle.com.

To get some further information about BMUG please write to: BMUG, 1442A Walnut Street #62, Berkeley, CA 94709. If you prefer to phone our business office call (510)549-BMUG, or FAX (510)849-9026.

Upcoming Events:

January 5–8	Macworld Expo. Come visit BMUG at Booth #1041 and the User Group Room, Rm. 112.
January 6	Charles River Analytics, Open Sesame; Great Plains Software, Dynamics (accounting).
January 13	Steven Levy, Insanely Great (book); ProVUE Development, PowerTeam (PIM); Stac Electronics, Stacker for Macintosh (compression).
January 17	BMUG South meeting at United Way office in San Jose. Hewlett-Packard, new printers; Storm Technology, Apple Photoflash (digital photo software).
January 20	CIC MacHandwriter (pen input for desktop Macs); Maxis SimCity 2000 (game and education in one).
January 27	ChipSoft, MacInTax for 1993; Virtus Corp., Virtus VR (3-D virtual reality software).
January 31	BMUG West meeting at Exploratorium museum in San Francisco. Guy Kawasaki, UnderWare (screen saver); ImageSmith Yearn 2 Learn.

Important Notice: BMUG main meetings are now held in 22 Warren Hall on the U.C. campus. Please call the BMUG Announcement Line (510)849-9114 for the latest info on BMUG meetings, special interest groups, and seminars.

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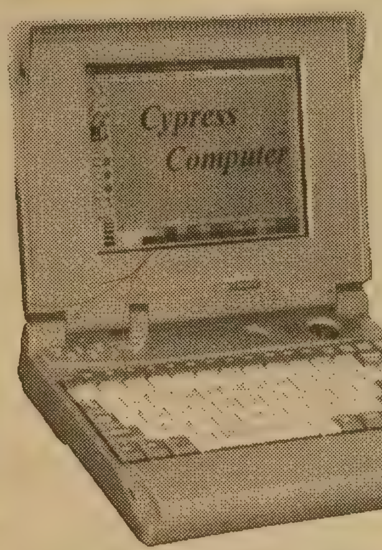
intel inside



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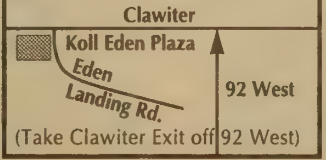

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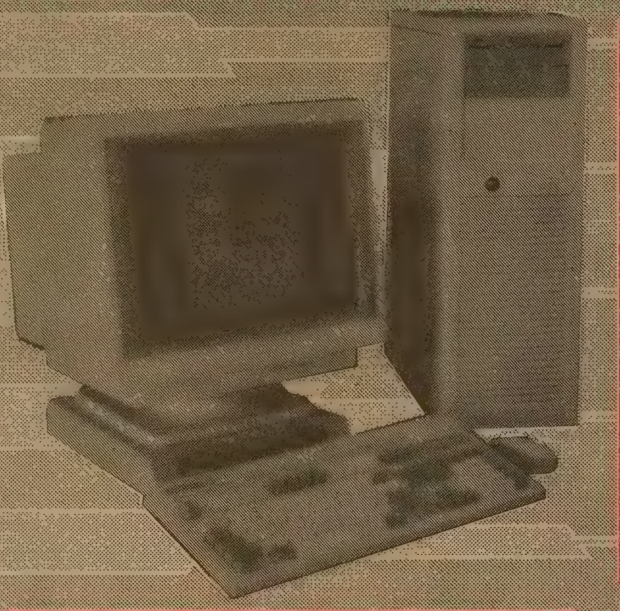

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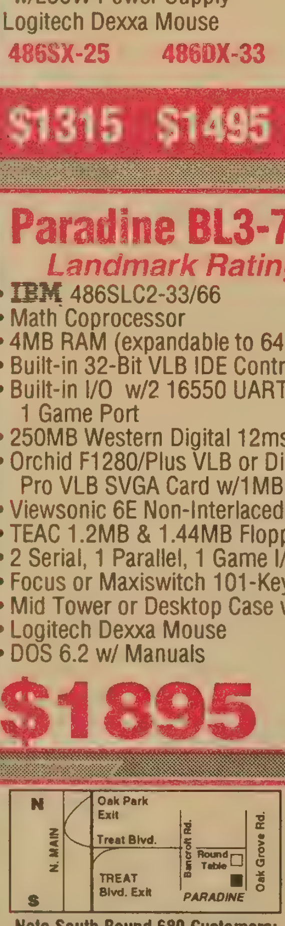

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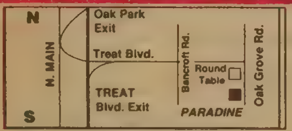

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Sample Rendering Speeds

on 50PMAN.3DS, a 3000-face posable manikin figure file included with 3D Studio, on a 486/33DX, Phong shading, default setup:

Release 3.0 (DOS)	46 seconds
Release 3.0 (Win 3.1)	53 seconds
Release 2.0 (DOS)	59 seconds

you to mark off a specific area in the viewport to be rendered (blowup works in much the same way, but enlarges the area selected). Object rendering means you can prototype specific objects without having to make the whole scene.

You can also set up backgrounds, apply special effects like layered fog, configure file formats (including TARGA, .GIF, JPEG, .TIF, and .BMP), and control shadows. Very tight option controls are included for creating object and motion blur, controlling dithering, selecting pixel size, and more.

Upon selecting the setup or view to be rendered, you then choose options in the Render panel. These include antialiasing, wireframe generation, and auto-reflection. You can also switch between different rendering styles, save your image to disk, send it to a printer, and render to a network. As the rendering proceeds, a "blood bar" at the top of the panel indicates progress, and the image is automatically displayed (if you have the Display option selected). Rendering speeds on fairly complex scenes were quite passable on my 486/33, thanks to the enhanced rendering engine.

Network rendering is also included with this release, and you can install to 9999 DOS networked machines that will act as slave renderers to your server system. In this case, only one machine will have the 3D Studio interface, but all of the machines will distribute the rendering work. You may not intend to install to ten thousand systems, but setting up a low-cost LAN is easy, and a few $2500–$3000 Pentium-based machines will dramatically increase your rendering speed. You can also tap the power of a PC-based network you may already have in place. The network interface is well thought out and is one of the most impressive features in 3D Studio Release 3.

KEYFRAMER

Beyond still rendering is the studio-level Keyframer, which can generate animations and render them to disk files and videotape recorders. It has a similar interface to the 3D Editor module, but it also has the ability to plot frames according to specific paths of movement. For example, when you track in with the camera on an object in the Keyframer, it can plot the path of the track as a series of moves, and then render the frames in the movement. The result is a smooth tracking shot.

Object movement can also be created by picking up an object in the first frame, moving it in 3-D space, and then clicking on the end frame. You can also move lights this way. The Keyframer will generate a smooth series of frames, with a default of thirty, but you can adjust this as well. An advanced feature of this module is the ability to create smooth morphing effects between objects.

The Keyframer also includes a Video Post facility that can sequence effects and model movement, and will allow you to create entire animations in-camera without having to edit them together. An interface to VTR equipment in the Keyframer means you can render frame-by-frame animation directly to videotape without a time-base corrector.

IPAS

3D Studio's most important special feature is the IPAS command structure. These are a series of processes that can be operated on rendered objects and scenes externally. As such, they're a lot like Adobe Photoshop plug-ins, and allow for custom effects work and extensibility. IPAS 3 is the current designation, and refers to special image processing, procedural modeling, animated stand-in, solid patterning, Keyframer, and bitmap routines. The examples included are clear (one generates a star map according to the camera coordinates in your scene; another creates custom gear teeth in an object), and a programming interface allows you to make your own effects and save them as applicable processes.

Among the new features in IPAS 3 Keyframer are processes for including dynamic controls in an animation (like gravity and collision detection), and the ability to load and save bitmap file formats not directly supported in 3D Studio. The extensible interface means that you can explore options and effects almost infinitely.

MISC.

Support for many SVGA and TARGA cards is included, as well as for frame buffers that can allow you to render scenes on separate monitors, while keeping the 3D Studio interface up and running. This allows for rapid prototyping. Animation support is good, with my only caveat being that the supplied standalone DOS player AAPLAY.EXE does not appear to run .FLC (FLI-8) files which the renderer generates, although you can view them inside the program. The player also doesn't let you load animations into memory for faster playback. I'd suggest you find a copy of AAWIN.EXE, a public domain Windows animation viewer by Autodesk that supports a range of file formats and has options for loading files into memory. The AAWIN player should be available on CompuServe in the Adesk Forum. It's also available on the WELL (415/332-6106, 8-N-1) in the IBM conference library as a .ZIP file (AAWIN.ZIP) which contains the executable, the icon, and the help file. Unzip it to your Windows directory and follow the standard procedure for installing a new program item.

A number of sample models, textures, and bitmaps for the various 3D Studio modules are included, and these work well with the excellent tutorials. I'd suggest installing a CD-ROM drive, if you don't already have one. 3D Studio Release 3 comes with a revised World-Creating Toolkit CD. This will give you access to about 700MB of additional material and model samples, including marvelously complex files (like a Buddha from Viewpoint Engineering with seventy-five thousand faces) that are very inspiring. Also on the CD are incredible animations created in 3D Studio that will get your mind in gear.

CONCLUSIONS

3D Studio is a miracle of DOS programming. This is one of the few programs that takes this workhorse computer and literally squeezes every last drop of CPU potential out of it. With an easy network interface, and Pentium processors on the horizon, this program will go far.

It's truly an enabling software experience, and proves that computers can be used to further the human imagination. ■

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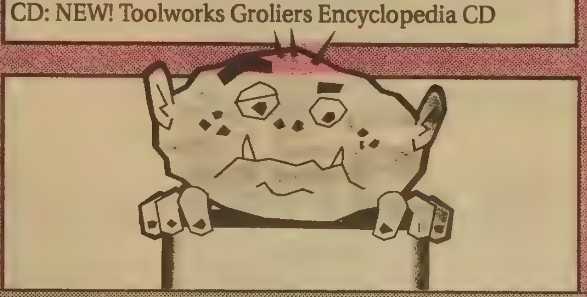

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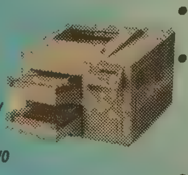

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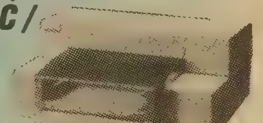

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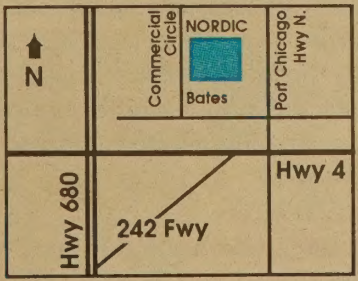

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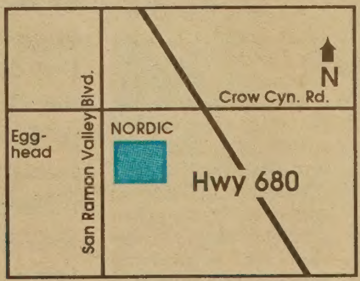

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The More Things Change...

Net Traffic Of The Future

BY JOHN C. DVORAK

I finally got my download from the year 2043 from the Federal Office of Reverse Galactic Studies. Apparently some time in the future a time mirror was placed in orbit around the earth; it has the ability to capture electronic transmission from the future. I've been on a waiting list for two years.

While others wasted their energy getting the winners of the Kentucky Derby, I asked for a simple Internet feed to see what people would be talking about in fifty years.

It looks as if nothing has changed!

Date: 17-Aug-43 16:51 PDT
From: spence@macro.lotus.univ.golub.mega.org
Subj: RRNT or Dresden?

Microsoft is already five years late on RRNT [ed note: RRNT stands for really, really new technology] and I suspect Dresden (aka Windows 40.0) will ship before RRNT ships.

DVORAK'S LAST COLUMN

Copyright © 1994 by John C. Dvorak. All rights reserved. John C. Dvorak graduated from the University of California. He is a contributing editor of PC Magazine *and* MacUser, *and is considered by many to epitomize the contrarian view of things—a charge that he vehemently denies. Dvorak's motto is: If you have nothing nice to say, then don't say anything at all.*

The joke going around the office is that RRNT means really, really *not* there! Hahahahaha!

Date: 18-Aug-43:
TO: Multiple recipients of list OS/19
From: Mesa@corncob.TexasA&M.edu
Subject: Re: Windows RRNT

> > BTW, have you looked at RRNT?

Too much memory, too much disk space, too much money, the box is too heavy, networking features I don't need. I suspect Microsoft told everyone to develop for RRNT so that they could work on Dresden applications and then dump RRNT (like they did Desktop OS).

RRNT apparently has this "network security" feature which allows the system administrator to monitor *everything* you do, including what you do at home away from the computer. If its GA is anything like the last beta, it's a proprietary mu-Unix with the Win29 interface. Slow, resource hungry, and incapable of running on most of the current Win29 machines out there.

As for why Dresden is taking so long—they actually have to develop the code themselves. They don't have a technology partner (Nintendo) and there doesn't seem to be a company out there with an meta-OS that they can buy and claim as their own.

TO: Multiple recipients of list OS/19
FROM: bluebell@random.number.com
Subject: InfoWorld about Windows RRNT

This week's *InfoWorld* has a cover story about Windows RRNT—the gist of it is that it makes a good uber-server, but a "poor" uber-operating system. Some of the criticisms:

1) System resources (12 gigabytes RAM (16 recommended), 70GB disk space support features like CPO security that are not really needed on most PCs.

2) Performance running DOS and 256-bit Windows apps was described as "abysmal." Loading some Windows apps was as much as 75% slower than under Windows 29 (that compares to 10% slower under OS/19). That was in a 16GB config—the performance with 12GB was even worse.

3) Based on stats from a download in the background, they stated that OS/19 is a better multidimensional tasker than Windows RRNT.

4) There was a gripe about Dresden "next year," and how Microsoft is downplaying RRNT for the desktop and pushing Dresden.

5) The article basically said that OS/19 has a golden opportunity as a higher-end desktop OS, since Dresden is a good year off. Wouldn't surprise me to see 19.1 come out at the same time or before Dresden.

Date: 26-Aug-43
TO: Newswatch list
From: Gogetter@archives.dusty.old.books.org
Subject: HAYES OFFERS PCMCIA UNIT

Modem maker Hayes Microcomputer Products, Inc. has released its Blastmaster ISDN/X8 gigabit modem for PCMCIA, a high-speed, internal data/fax modem that provides both asynchronous and synchronous data communications.

Date: 24-Aug-43 3:33 am EDT
To: everyone concerned
From: Lockness@crumbcake.cartoon.dog-ear.cal.edu
Subject: In-depth review

For once, there is an in-depth review of OS/19 in one of the UK computer magazines. The review covers fourteen pages, rather more than the usual page or two. The front cover headline is slightly amusing "Buy it now or wait for Windows RRNT?" Aren't we all going to rush out and spend four thousand pounds on RRNT and two thousand pounds or more for the RAM to get it to run in order to *down*grade? Hahaha.

Date: 29-Aug-43 06:21:34
To: Dreamers
Fm: Zachmeister@hydrogen.peroxide.com
sb: RRNT still means really, really not there

Dreamers.

Yes, Microsoft has said that both Window RRNT and RRNT/AS4000 have bee "released to manufacturing" as of thi Monday. That "thirty days ahead of sched ule" might just be taken with a grain of sal though, since the promises for AS4000 hav always been keyed to delivery of the bas version of RRNT. Had RRNT shipped by th end of last year as originally promise AS4000 would now be over six months late.

There is still a curious lack of enthusias for the whole business on the part of th Microsoft folks over on WIN512 and WIN RNT, though. Some of the hard-core RRN enthusiasts did some initial jumping and down and shouting mildly but eve that faded rather quickly.

OK, so these are just today's online mem dressed up to look like something from t future. Any bets that these notes won't *much* different? ■

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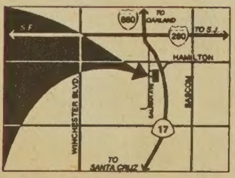

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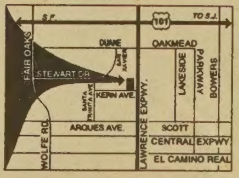

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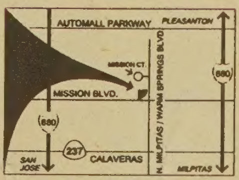

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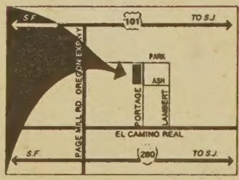

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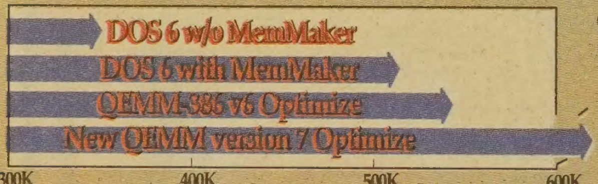

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How we got the chart numbers: CPU—486/33 ALR Power/business VEISA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the driver (or drivers) required by each memory manager, the following drivers, DOS resources and programs were loaded for all comparisons: in the CONFIG.SYS file: SETVER.EXE, DOS=HIGH, FILES=20, BUFFERS=10, STACKS=0.0, MVSOUND.SYS, SNDBK12.SYS, SLCD.SYS, DOS SHELL=statement, in the AUTOEXEC.BAT file: VSAFE, MSCDEX, UNDELETE, LSL.COM, NE2000.COM, IPXODI.COM, NETX OR EMSNETX, MOUSE.COM, SMARTDRV.COM, PRTSCCAP.COM.

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